OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1986 RESEARCH, ENGINEERING AND DEVELOPMENT BUDGET REQUEST

HEARINGS

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

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OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1986 RESEARCH, ENGINEERING, AND DEVELOPMENT BUDGET REQUEST

TUESDAY, MARCH 19, 1985

House of Representatives,
Committee on Science and Technology,
Subcommittee on Transportation,
Aviation, and Materials,
Washington, DC.

The subcommittee met, pursuant to call, at 2:10 p.m., in room 2325, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Mr. Glickman. Why don't we go ahead and begin.

When Mr. Lewis gets here, he can make a statement, or it will be included in the record at his pleasure.

Today the subcommittee will begin oversight hearings on the FAA's research, engineering, and development programs for fiscal 1986.

The FAA's programs are designed to improve our Nation's air traffic control system by increasing its safety, productivity, and capacity in response to expected air traffic demands in the future.

In addition, many of these programs are also devoted to increasing the safety of aircraft through the development of less flammable aircraft materials, safer fuel, and improved structures.

This subcommittee has had a direct role and interest in the improvement of the air traffic control system for some time now. This role has intensified since the subcommittee initiated House Resolution 202, passed in 1981, directing the FAA to submit a long-term plan to Congress to modernize the air traffic control computer system.

The national airspace system plan proposed by the FAA in 1982 was strongly endorsed by Congress and incorporated in the Airport and Airway Improvement Act of 1982.

Also the NAS plan has been fully funded through aviation user taxes. The Office of Management and Budget, and sometimes Congress, has been unwilling to support authorized funding levels.

The fiscal year 1986 request represents a cumulative $58 million shortfall below the total authorizations to date in the Airport and Airway Improvement Act.

Similarly, the facilities and equipment budget has suffered a shortfall of $1.02 billion below the $4.9 billion total authorizations to date as envisioned in the act.

While implementation of the F&E programs are not strictly within the subcommittee's purview, maintaining the continuity of FAA's programs from research, engineering, and development through implementation as facilities and equipment is essential to the success of the NAS plan.

Thus, the subcommittee has chosen to sustain an arm's length oversight of the programs in cooperation with other key aviation subcommittees.

This year, the NAS plan has reached a critical phase, and we are concerned about keeping the momentum toward fulfilling the critical milestones head. Yet we are concerned about the always troubling funding problems and the implementation slips in the program plan.

Today we will hear an overview of the status of the NAS plan from FAA Administrator Don Engen, and we will also hear from other folks who are listed on the witness list, and so I look forward to a productive hearing.

I am pleased that the FAA Administrator, Admiral Engen, is here.

I understand you have to leave fairly early, which is fine—not fine with us that you have to leave, but we understand that others at the FAA will give more detailed testimony.

However, if you have a short statement, we would ask that you go ahead and give that now. We may have a few questions for you, so that you can then leave and we can go ahead with the—Mr. Albrecht and the others at the FAA.

STATEMENT OF HON. DONALD D. ENGEN, ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION, WASHINGTON, DC, ACCOMPANIED BY AL ALBRECHT, ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS; FRANK FRISBIE, DEPUTY ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS; AND NEAL BLAKE, DEPUTY ASSOCIATE ADMINISTRATOR FOR ENGINEERING

Admiral Engen. Thank you, Mr. Chairman, very much. I serve at your pleasure.

It's indeed a pleasure to be before you today, Mr. Chairman and members of the subcommittee.

I have with me today Al Albrecht, on my left, the Associate Administrator for Development and Logistics; and Frank Frisbie, Deputy Associate Administrator for Development and Logistics, on my right.

Frank is also directing our National Airspace System Plan effort.

And I have also Neal Blake with me, who is a Deputy Associate Administrator for Engineering.

I've furnished a statement for the record, and I have just a very short statement that I would give orally, Mr. Chairman.

This is an extraordinary year for Federal budgeting, and our programs are certainly no exception. The need to curb the Federal deficit has generated an unprecedented degree of fiscal scrutiny of every Federal program.

Our programs, appropriately, have undergone that same kind of rigorous review within the administration. Our requests for fiscal year 1986 in both the RE&D and Facilities and Equipment, reflecting the need for fiscal prudence, are below the levels set forth in the authorizing legislation and consistent with the President's important budgetary goals for fiscal year 1986.

It was not a simple task for us to pare our budget requests. This required that we take a particularly hard, objective look at our programs and reorder our program needs in a way that the most critical needs were dealt with first.

As you know, any research and development process is a dynamic one, regardless of budgetary changes, and it's necessary to oversee and manage needed changes so that they remain consistent with the established objectives. We have done that.

Both requests will keep our research programs and the work needed to support the NAS plan essentially on schedule.

There is an $18 million difference between the RE&D authorization and request levels. Before any reduction was made, I set two basic priorities: first, we must continue to emphasize safety; and, second, we must provide continuity of support to the NAS plan.

These are the fundamental ground rules we have used and will continue to use to manage our programs consistent with the need for fiscal constraint.

Insofar as our RE&D funding is concerned, the advanced automation program has a requirement for slightly more than 53 percent of the RE&D request. We will continue our emphasis on this program because of its critical nature.

Consequently, the funds available for some of the other programs are, indeed, limited, meaning that there are constraints in applying the remaining funds toward nonsafety or non-NAS plan efforts.

Therefore, we will shift program emphasis in the following ways: We will defer for a few months some of the longer range types of efforts in the aircraft safety area. We have deferred advanced research and technology efforts, such as the application to aeronautical purposes of advanced capabilities in satellites, sensors, and displays.

We have curtailed some non-safety-related airport R&D. We have adjusted the weather program to concentrate on the most critical and immediate requirements, and we have deferred contract efforts on flight service automation enhancements.

The annual updating of the NAS plan is in progress, and we plan to make the initial distribution of the update this April—in the month of April. There will be no major changes in the plan.

I believe we are making solid progress in the upgrading and modernization of the air traffic control system. This includes research and development as well as facilities and equipment projects which evolve largely from R&D.

I am pleased to report that, of these major programs, the Host, Advanced Automation, ASR-9, MODE-S, and Voice Switching and Control Systems are not only on schedule but within the budget we have allocated to them.

We are now evaluating the production proposals and will award the Host production contract in July. The advanced automation system design competition activities are continuing on schedule.

We have issued the request for proposals for VSCS and ASDE 3. We have exercised the options for the fiscal year 1985 quantities of the ASR-9 and MODE-S, and we have awarded two contracts for the equipment fabrication and execution of the TCAS limited implementation program.

Alternative studies are being considered of the FSS and Mexrad programs. We are currently studying the possibilities of turning some or all of the flight service station functions over to the private sector. We have initiated the study and anticipate its completion by the end of May.

At this point, I do not plan any major changes of direction in our flight service station modernization program. I assure you, we will review carefully whatever information is developed during the course of that study.

Before closing, Mr. Chairman, I want to make an observation concerning the future direction of our research and development efforts.

I am concerned that the concentration of supporting the NAS plan could be at the possible expense of a research and development program that should be looking into the system needs for the year 2010 and beyond.

To ensure that we pay adequate attention to a longer range R&D, I have directed that we develop a comprehensive plan envisioning the needs of the early decades of the 21st century. That effort has been underway for several months and will be completed by October.

I'm sure you will share my interest in such a project, and we will be pleased to discuss our plans with you in detail as they evolve.

Mr. Chairman, that does include—conclude my overview of the RE&D and NAS plan activities. Tomorrow, Mr. Albrecht, Mr. Blake, and Mr. Frisbie will fill you in on the details of the various R&D programs.

To complete our presentation today, and with your permission, I would like Mr. Frisbie to discuss the status of the system engineering integration, or SEI, contract, and our fiscal year 1986 RE&D and NAS Plan Program resource requirements, and our management efforts to complete the overall upgrading and modernization of the air traffic control system in a timely and economical manner.

He's going to be covering in more detail some of the things I've said, and, with your permission, sir, I would like to let Frank give his portion of the brief, and then we would both respond to your questions.

[The prepared statement of Admiral Engen follows:]

STATEMENT OF THE HONORABLE DONALD D. ENGEN, FEDERAL AVIATION ADMINISTRATOR, BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS, CONCERNING THE RESEARCH, ENGINEERING AND DEVELOPMENT PROGRAM AND THE NATIONAL AIRSPACE SYSTEM PLAN, MARCH 19, 1985

Mr. Chairman and Members of the Subcommittee:

It s a pleasure to appear before you again. I have with me today: Al Albrecht, the Associate Administrator for Development and Logistics; Frank Frisbie, Deputy Associate Administrator for Development and Logistics, who is directing our National Airspace System (NAS) Plan effort; Neal Blake, the Deputy Associate Administrator for Engineering; and Val Hunt, Director of the Advanced Automation Program.

We will review our fiscal year 1986 budget request and future program requirements in the Research, Engineering and Development (R,E&D) Program and our progress in the implementation of related programs in the National Airspace System (NAS) Plan.

This is an extraordinary year for Federal budgeting and our programs are no exception. The need to curb the Federal deficit has generated an unprecedented degree of fiscal scrutiny of every Federal program; our programs, appropriately, have undergone that same kind of rigorous review within the Administration. Our requests for FY 1986 in both R;E&D and Facilities and Equipment (F&E), reflecting the need for fiscal prudence, are below the levels set forth in the authorizing legislation, consistent with the President's important budgetary goals for FY 1986.

I don't want to suggest that it was a simple task for us to pare down our budget requests; it was not. As I will describe in a moment, it required that we take a particularly hard, objective look at our programs and reorder our program needs in a way that the most critical needs were dealt with first. Of course, any research and development process is a dynamic one, regardless of budgetary changes, and it is necessary to oversee and manage needed changes so that they remain consistent with the established end objectives. We have done that with our current budget requests. Both requests will keep our research programs and the work needed to support the NAS Plan essentially on schedule.

To achieve the $18 million difference between the R,E&D authorization and request levels, I set two basic priorities: one, we must continue to emphasize safety; two, we must provide continuity of support to the NAS Plan. These are the fundamental ground rules we have used, and will continue to use, to manage our programs consistent with the need for fiscal restraint. Insofar as our R,E&D funding is concerned, the Advanced Automation Program alone has a requirement for slightly more than 53 percent of the R,E&D request. I have directed that we continue our emphasis on this program because of its critical nature. Consequently, the funds available for other programs are limited, meaning there are constraints in applying the remaining funds toward non-safety or non-NAS Plan efforts. Therefore, we will shift program emphasis in the following ways: we will defer some of the longer range types of efforts in the aircraft safety area; we have deferred advanced research and technology efforts such as the application to aeronautical purposes of advanced capabilities in satellites, sensors, and displays; we have curtailed some airport R&D that is directed toward system efficiency rather than safety; we have adjusted the Weather Program to concentrate on the most critical and immediate requirements; and we have deferred contract efforts on Flight Service Automation enhancements.

The annual updating of the NAS Plan is in progress, and we plan to make the initial distribution of the update in April. There will be no major changes in the plan. Our overall cost estimate for the implementation of the plan will remain at

$11.7 billion. Funding requirements will be adjusted to reflect the fact that the F&E authorization for fiscal years 1982 through 1987 will not be fully utilized by the end of FY 1987. Frank Frisbie will elaborate on these points in his presentation.

From an overall perspective, I believe we are making solid progress in the upgrading and modernization of the air traffic control system. This includes Research and Development as well as Facilities and Equipment projects which evolve largely from the R&D. I am pleased to report that, of these major programs, the Host, Advanced Automation, ASR-9, Mode-S, and Voice Switching and Control System (VSCS) are not only on schedule but within the budget we have allocated to them. We are now evaluating the production proposals and will award the Host production contract in July; the Advanced Automation System design competition activities are continuing on schedule; we have issued the request for proposals for VSCS and ASDE-3; we have exercised the options for the FY-1985 quantities on the ASR-9 and Mode-S; and we have awarded two contracts for the equipment fabrication and execution of the TCAS limited implementation program. I intend to continue to personally monitor these programs on a recurring basis to assure a continued emphasis on both timeliness and cost consciousness.

With respect to the Microwave Landing System (MLS), we project a possible 9 month delay in getting delivery of the first production unit because of the contractor's delays in achieving a design which is acceptable to us. If this occurs, we intend to offset the delay by accelerating efforts during the production run, so that, overall, MLS implementation should be completed on schedule. This illustrates the point I made earlier about how, independent of budgetary issues, any effort to upgrade technology is a dynamic process in which changes are inevitable; the difficulty is in managing those changes in a way that the end objective is met.

Alternative studies are being conducted of the FSS and NEXRAD programs. We are currently studying the possibilities of turning some or all of the flight service station functions over to the private sector. We have initiated the study, and anticipate its completion by the end of May. At this time, I do not plan any major changes of direction in our flight service station modernization program. I assure you we will review carefully whatever information is developed during the course of the study.

We are not requesting FY 86 funding in F&E for the FSS automation effort and have deferred the contract work on enhancements in R,E&D until completion of the study. We do not anticipate these deferrals will compromise our overall ability to pursue the program to its conclusion, should the study confirm that no fundamental change in direction is appropriate.

The National Weather Service (NWS) will soon conduct studies involving technical alternatives and related economic considerations regarding the NEXRAD Program. Specifically, they are seeking to verify whether any "off-the-shelf" technology exists which would meet specified operational requirements. Although funding for limited production contracting has been deleted from both the NWS and FAA FY 1986 requests, we have continued our efforts on the evaluation of a competitive design runoff to preclude unnecessary delays if the current direction of our program is confirmed by the study.

Before closing, Mr. Chairman, I want to make an observation which I believe is significant concerning the future direction of our research and development efforts. I am concerned that concentration on supporting the NAS Plan may be at the possible expense of a research and development program that should be looking into the system needs for the year 2010 and beyond. In other words, have we focused too sharply on the immediate tasks at hand, forcing us into a catch-up game later on to meet the needs of the next century? Therefore, I have directed that, to ensure that we pay adequate attention to longer range R&D, we develop a comprehensive plan envisioning the needs of the early decades of the 21st Century. That effort has been underway for several months, and will be completed by October. I am sure you will share my interest in such a project, and we will be pleased to discuss our plans with you in detail as they evolve.

Mr. Chairman, that concludes my overview of our R,E&D and NAS Plan activities. Tomorrow, Al Albrecht, Neal Blake, and Frank Frisbie will fill you in on the details of various R&D programs. To complete our presentation today, with your permission, I would like Frank to discuss the status of the System Engineering Integration (SEI) contract, our FY 86 R,E&D and NAS Plan program resource requirements, and our management efforts to complete the overall upgrading and modernization of the air traffic control system in a timely and economical manner. When he has completed his briefing, we will be pleased to answer your questions.

Mr. GLICKMAN. OK. All right.

If you would prefer for me to ask a few questions now, I would. Otherwise——

Admiral ENGEN. I think it would be better if I were to wait.

Mr. GLICKMAN. OK. Sure.

Admiral ENGEN. And I will be here at your beck and call.

Mr. GLICKMAN. Alright.

Mr. FRISBIE. Thank you, Admiral.

Thank you, Mr. Chairman.

Let me get our projectionist in place here.

[Slide shown.]

Mr. FRISBIE. We'll be speaking a little bit this afternoon, Mr. Chairman, about our research, engineering, and development activities and our NAS plan.

The first area that I want to cover is what we call the SEI contract—the systems, engineering, and integration contract.

This contract was awarded January 31, 1984, to Martin Marietta Corp. It supports the FAA and the national airspace system plan implementation. It is a 10-year contract, a 5-year firm contract with two options to extend it to 10 years.

The total cost of that contract is estimated at $684 million. It's a cost-plus-award fee contract. There is no base fee; there is no guaranteed profit. We award the fee each 6 months based on the SEI's performance and on our achievement of NAS Plan Programs and objectives.

I'm the technical officer and the fee determining official on the contract.

Current staffing level on the contract is on schedule. They have about 600 people on board at Martin Marietta and at their subcontractors.

[Slide shown.]

Mr. FRISBIE. The principal areas where they support FAA are in NAS Program management, where they support me as the NAS Program Director. Some of those areas are the NAS plan update and audit—I'll be talking a little bit more about the audit later—also schedule cost benefit and risk analysis—I'll be talking a little bit about that later also—in program control tools, NAS configuration management.

In systems engineering, they support Lee Page, and FAA Systems Engineering Service, in design standards, top level system design, and a transition plan for the implementation.

In advanced automation, they support Val Hunt in the FAA's Advanced Automation Program Office.

[Slide shown.]

Mr. FRISBIE. They're providing program management support, technical support, and something we call IV&V—software IV&V—independent verification and validation.

They also support Marty Pozesky's organization, APM—the FAA's Program Engineering and Maintenance Service—where they're providing technical support and architectural and engineering services.

So you can see, Mr. Chairman, they embrace all of the FAA's air traffic control engineering organizations.

[Slide shown.]

Mr. **Frisbie**. Some of the things that have been done in the first year: The NAS plan audit; they've helped us with the update of the 1985 NAS plan to—also to baseline the schedules of the NAS plan, which we will issue, together with the issuance of the 1985 plan, and put those under formal schedule control; NAS financial analysis and budget crosswalk, so that we can tie together both the plan and the budget documents and in configuration management.

In systems engineering, the top-level NAS design has been baselined and placed under configuration control. We've had a preliminary design review of the NAS specifications with performance requirements. We have a draft of the transition plan. They've helped us with several studies and, very importantly, have helped us update our design standards that we apply to these contracts so that we will be fully attuned with the current state of the art.

[Slide shown.]

Mr. **Frisbie**. In advanced automation, they're helping with program management support, helping with the post-computer technical support and transition plan, working on the advanced automation system IV&V, using Martin Marietta subcontractor, Logicon Corp., and on the advanced automation system technical support.

In the project management area, they're providing technical support to over 20 of our projects, including the MLS, the voice switching and control system, flight service automation system, the Mode-S secondary radar, and the airport surveillance radar No. 9—ASR-9; also helping us with the area traffic control center building expansions, where their architect and engineering subcontractor, Ralph Parsons, is doing that work.

[Slide shown.]

Mr. **Frisbie**. Just a little bit about the plan itself, Mr. Chairman.

As you've indicated, it's a comprehensive plan for modernizing and improving the air traffic control and airway facilities services through the year 2000. It was first published in December 1981, updated it twice in 1983 and 1984, and, as the admiral has said, we're planning to issue it again in April 1985.

The plan is linked to the funding authorizations in the Airport and Airway Improvement Act, and the source of the funds is the trust fund established by the legislation.

[Slide shown.]

Mr. **Frisbie**. The plan themes are to have gains in safety, capacity, productivity, and economy through replacing older vacuum tube technology equipment and by establishing higher levels of automation, consolidations of major facilities such as the flight service stations, and the application of new and lower-cost technologies and telecommunications.

[Slide shown.]

Mr. **Frisbie**. A little bit about the NAS plan audit.

The audit was a contractual requirement of the Martin Marietta contract, and they were required to audit the 1984 edition of the NAS plan. It included a critical review of the technical feasibility, cost, schedules, and benefits.

We also considered it an important first step for the contractor, so that we could be sure he had a detailed understanding of the NAS Plan Programs, that he could give us intelligent inputs into the 1985 update of the NAS plan, and that he could also step up to his commitment to share with us mission responsibility for the plan.

[Slide shown.]

Mr. Frisbie. The audit of the plan achieved its objectives. There were 203 recommendations, 25 percent of those in the management area, 75 percent in the technical area.

One hundred and fifty-nine of those recommendations were fully accepted by FAA; thirty-four were partially accepted; and ten were rejected.

The majority of the responsive actions are in the SEI contract and are underway. So they have identified things that we had included in the contract in our part of our process to get those taken care of.

We also have some new initiatives that had not been included in the contract, and we're assigning and tracking those.

[Slide shown.]

Mr. Frisbie. Just a bit about the management control process.

Admiral Engen has strongly encouraged us to institute a full range of program management disciplines at the NAS Program level.

As an example, I've indicated here the schedule control process that we're implementing.

The NAS Program—all 90 projects are being entered into the schedule control system. The master schedule baseline will tie, as I said, to the 1985 NAS plan. The formal change control process is being established. I will control 14 key milestones for every project, and changes will be made to the baseline only after a formal review and approval.

The administrator will review the major system acquisitions—we call them "designated major system acquisitions"—and the schedules, as he does on a regular basis quarterly. He will review—receive monthly a status report on the schedules for all the projects and quarterly be briefed by me on those.

Also, Martin Marietta presents, by virtue of their contract, a quarterly review of program content and the schedules for a broad FAA audience. We'll continue that, and, of course, the administrator approves the budget for submission, and we're hoping that the administrator will shortly approve the new NAS plan for issuance.

[Slide shown.]

Mr. Frisbie. With respect to the plan itself, Mr. Chairman, this is an attempt at a shorthand which says that the $11.7 billion is broken up into four pieces; $2.5 billion is of an annual recurring nature, and across the bottom we've arrayed the apportionment between those projects that are listed as air traffic control and those that are advanced automation, and on the extreme right, the systems engineering and integration contract.

Last year, we reported that at the end of 1985 we would have 78 percent of those by dollar volume of that $6 billion committed in air traffic control, that 100 percent of the advanced automation dollars would be committed, and that 100 percent of the systems engineering and integration money would be committed, for a weighted average of 86.

I'd remind the committee that we use "committed" here not in an accounting sense but, rather, to say that we have embarked on the contractual path which, taken to its conclusion, will use that money.

At the end of 1986, we're forecasting that 84 percent of the air traffic control dollars will be committed, giving us a weighted average of about 90 percent at the end of fiscal year 1986.

[Slide shown.]

Mr. **Frisbie**. Let me read these, Mr. Chairman. They're hard to read on that chart.

These are some of the major accomplishments we have for fiscal year 1985. The mode-S secondary surveillance radar contract was awarded in October 1984. The Federal radio navigation plan was published in December 1984. The ARTS interface with mode-S development contract was awarded February 1985.

The voice switching and control system request for proposals was issued in February 1985; and, prospectively, the radar microwave link systems contract award we're projecting for April. The air traffic control Host computer acquisition contract award we expect in July. Enhanced TCAS to National Standard, we expect to be issued in June.

The airport surface detection equipment contract—airport surface detection equipment radar contract to be awarded in September, and runway visual range equipment contract award in September also.

These are just a few of the examples, Mr. Chairman, of the ongoing momentum that we've built up.

Thank you, Mr. Chairman.

Mr. **Glickman**. Thank you, Mr. Frisbie.

Let me just ask a few questions.

Admiral Engen, I wonder, first of all, if we might talk a little bit about the generic issue of the utilization of moneys in the trust fund.

As I understand it, and as you are well aware, Congress raised gasoline taxes and airport ticket taxes in order to finance the operations of the trust fund, but primarily the operations of the development of air traffic control system—the modernization of the system—is taking the bulk of those funds.

Are you satisfied that you are spending those funds in accordance with the taxes that have been raised on the user of airplanes in this country?

Admiral **Engen**. Mr. Chairman, my goal is, of course, to expend those moneys that are approved, and, yes, I am dedicated to using those moneys from the trust fund as apportioned in the budget.

It's a—it's a continuing goal of mine to continue to expend those trust fund monies as they have been appropriated to be expended.

Mr. **Glickman**. Well, in connection with the President's budget request, the implication in your testimony is that you received back less than what you requested, and I'm wondering with respect to the modernization of the system, did you receive back less than you requested in terms of the capital expenditures necessary to implement the NAS plan?

Admiral **Engen**. No. What I did, Mr. Chairman, is, I set aside the Host computer, the advanced automated software, as key programs which are daily—we need daily to make the system function, to take care of the capacity and to carry us forward, and there has been no reduction whatsoever in those areas, and the reductions that we've taken have been in ancillary areas.

There have been some 19 programs in which we've taken lesser—a lesser cut at because of the desire to honor the President's budget.

Nothing has been cancelled. Some things have been delayed a little bit, but our plan is—the plan is there, Mr. Chairman. It has a beginning, and it has an end, and it's my goal to—to complete this NAS plan on schedule in 1992-93.

Mr. GLICKMAN. Now, in the facilities and equipment area, did you take a cut? That is, did it come back less than what you requested?

Admiral ENGEN. It did, sir, and I think it's some $365 million, I think. We agreed that we could stretch out our procurement in some areas.

Some of it was a result of our having to accommodate to delays in the program, but mostly it's a money question.

The $1.15 billion that is in the F&E account that is coming forward does account for our movement in the NAS plan. It will enable us to stay on schedule.

Mr. GLICKMAN. OK.

You see, as you're well aware—I think we've talked about this before—the moneys for the trust fund are not general income tax moneys for the most part; they are dedicated moneys that were raised for the specific purpose of doing certain things; and if we don't spend them for those things, we ought to reduce the taxes, which is something that I think the President might otherwise find acceptable in the effort to try to reduce taxes in this country.

But the point is that we raised those taxes to spend it on aircraft safety issues as well as modernizing the system, and I just don't want to see us, in our effort to stretch this out, find ourselves using these funds to make the budget deficit look better and not to do what people expected to be done when they had their ticket taxes increased and their user fees increased.

Admiral ENGEN. I understand.

My goal is to expend the trust fund, sir.

Mr. GLICKMAN. Well, then, in view of all the budget—the budget fluctuations, do you—you're telling us we can put a lot of credence on the schedules that you've set out for us?

Admiral ENGEN. Yes, sir. We—the NAS plan is essentially on schedule at this time.

As I said, there's a beginning and an end, and over the years we have had a delta, if you will, in the amounts of money between that which was planned and that which has been appropriated—approved, and I do not believe in changing the plan because in any given year we have failed to meet our funding.

It's a matter of managing the shortfall, if you will; that's what managers are for; and we are—we are operating to continue the plan and have it completed on time.

Now, I've got to look you in the eye and say that I've—I've got to come back, and I've got to ask for moneys in excess of that which I had planned for 1987 or 1988. You can't do it with mirrors.

But that is my plan, is to hold—hold the plan inviolate, try to meet that plan, and achieve the finances along the way in order to meet that goal.

Mr. **Glickman**. But what you're saying is, to be honest with us, that you've had to drop the numbers this year, but that will have to come back in at some place before the plan is completed.

Admiral **Engen**. It will. We haven't figured out how to do better with less. We are—there is a funding plan for the NAS plan. We are on schedule. We are not over-expended, and we've been toeing the mark both fiscally and on the time line.

Mr. **Glickman**. OK. Let me—are we still talking about $11.7 billion over 10 years?

Admiral **Engen**. Yes, sir.

Mr. **Glickman**. Let me ask you just a couple of questions.

You talked a little bit about some of the things you've had to curtail in order to meet budget requirements, and in your statement you state, "We have curtailed some airport R&D that is directed toward system efficiency rather than safety." What would that be?

Admiral **Engen**. That's the quality of the concrete that's poured. It has to do with the length of the life of a runway, and it's true, it's—it's important, and this has just been slipped a matter of 2, maybe 3, months really, from one fiscal year to another. My plan is to pick that up.

Mr. **Glickman**. OK. And "we have adjusted the weather program to concentrate on the most critical and immediate requirements." What does that mean?

Admiral **Engen**. Well, we've stretched out the long-range sensor and computer activities with regard to our weather radar, and we're talking R&D now, are we?

Mr. **Glickman**. Yes—R&D.

Admiral **Engen**. Yes, sir. Yes, that's the stretch-out on long-range sensor and computer activities in the amount of $1 million.

Also under that is terminal weather radar—excuse me. Terminal weather radar is $1.2 million, and we—that was deleted because there is an ongoing evaluation of the Nexrad which has been brought out through the triumverate of DOD, NOAA, and FAA, and NOAA has been tasked to study Nexrad.

Mr. **Glickman**. Some of the meteorologists have contacted me concerned about the changes in the Nexrad Program. What is this reevaluation of Nexrad leading to?

Admiral **Engen**. Well, I think we find ourselves—we have differing requirements. The military—the Department of Defense, and FAA, and NOAA got together. The military—I don't want to speak for them, but it's my understanding that—that NOAA, particularly, and the military are interested in more hourly updates, if you will, in weather.

We in the FAA are operators, and we deal in minutes, and we're interested in weather changes that we can detect in times like 2½ minutes.

This had driven us to be great proponents for Nexrad, because we want to be sure to see the severe weather, because we must advise pilots of the change in the weather, and, as you know, the terminal weather—the Doppler weather radar is—can be an offshoot of the Nexrad, and we want to be sure in the terminal Doppler weather radar that we have the ability to see wind shear.

We need Nexrad to get to the terminal Doppler weather radar, and so you will find me standing up as a proponent for Nexrad. I believe in it, and I will be working with NOAA and the Department of Defense while they are conducting the study.

Mr. GLICKMAN. But are they looking at this then with a different perspective in mind as trying to find some sort of option to Nexrad—that is, their predisposition would be not to go the Nexrad route?

Admiral ENGEN. That's what I understand, and of course that's—I think that's one of the options that NOAA's looking at.

I am not sure of the details on it, but I'm watching it with great interest, because I don't know of any current radars on the shelf which can provide the Doppler capability that we're looking for.

Mr. GLICKMAN. OK. Let me—before I turn over to Mr. Lewis, I wanted to ask you just a couple of questions. One is, we will be hearing from you and the FAA within the next couple of weeks on the antimisting fuel, the experiment.

We're sorry to have had to cut that hearing off. That was due to the fact that we weren't in session last week. But I wanted to ask you quickly about the issue in terms of your research activities.

Last night, there was a national news story about air quality on airplanes, and it was in connection with the National Research Council study of problems of air quality in aircraft and the fact that the air carriers may be turning off their air conditioners in order to save money.

Are you looking into this issue, and, if you weren't, are you now, and is it something that we can expect your—maybe your tech center or some of your other folks to be looking into?

Admiral ENGEN. I'm going—I'm going to say something, and then I'm going to ask Mr. Neal Blake to perhaps add something more.

The television clip last night was dealing mostly with ozone and the turning the packs off to conserve fuel to increase the range, And that is a problem, and yes, we are dealing with that in a research and development way and have been looking at it for some time, and the conditions are—are known.

I've talked to Senator Inouye. He's been very interested in it, and I believe he was on the clip last night as well. And so I've been monitoring this and will continue to do so.

Neal, can you add any words of wisdom to that?

Mr. BLAKE. Well, I think there are really two questions. One is the adequacy of the basic systems on the aircraft, and our examination of that says that they provide the proper quality of air.

So the question now really is in the operation of those systems with respect to fuel conservation, and that is something that our regulatory people are looking at.

Mr. GLICKMAN. OK. Well, the only thing that struck me about that article, again, is not only the issues that Mr. Blake talked about, but in the advent of deregulation with the more extensive use of airplanes than we might have seen before, we may see other questions raised, not only air quality but hygiene question raised, and other things that I would hope that the FAA does.

You know, I could just see one day, on television, we find some new breed of bacteria that is formed on airplanes because of the way that they're used that we never contemplated before, and I hope that doesn't happen. I just want to see you alert to a variety of issues that may—may deal with this.

Let me just close by saying that I appreciate your testimony and the work that you do at the FAA. I think that you do a fine job there.

From this subcommittee's perspective, both in your time as Administrator and Mr. Helms' time as Administrator, we kind of pushed the FAA in variety of air-safety-related issues which then have led or should lead to rulemaking a variety of things, whether it has to do with fire or other kinds of things, and I know that you've been in contact with Norm Hineta and others in—in terms of ensuring that the FAA go ahead and, where the research work has been done, that you implement rules necessary to protect the flying public in those cases where you're ready to move, and the other thing I would just mention in connection with this other issue, back on the air traffic control system, is that, you know, we want to see this system move ahead effectively.

We think that you've got a good management scheme there, but we don't want to see Mr. Stockman and crew take this money that's dedicated for these purposes and use them to reduce the budget deficit.

If we're going to do that, then we should just, again, lower the taxes or eliminate the excess in the aviation taxes, and we hope that you will be an advocate for that view within the Administration to ensure that those moneys are properly spent.

Admiral ENGEN. Thank you, Mr. Chairman.

Let me say two things. One, Secretary Dole and I both are dedicated to enhancing cabin safety, and she has been a prime mover, as well as myself, in trying to move along rapidly those things which will improve the safety of the air-traveling public, and I am dedicated to using the moneys as gathered in the trust fund.

I will work within the Administration.

Mr. GLICKMAN. Thank you.

Mr. Lewis.

[The prepared opening statement of Mr. Lewis follows:]

OPENING STATEMENT OF HON. TOM LEWIS, FAA OVERSIGHT HEARING, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS

Thank you Mr. Chairman. Anyone who travels by air today can certainly appreciate the importance of increasing the capacity of the air space system. Improving safety and efficiency are always worthwhile goals; and, as a pilot, I have more than a casual interest in seeing the promises of the NAS plan realized. Therefore, I'm very interested to learn what our expert witnesses here this afternoon think the prospects are for achieving these goals.

There have been disturbing reports lately that some of the NAS programs are in serious trouble. It's appropriate that we continue to look hard at these and satisfy ourselves that the plan that was put in place in 1982 still makes sense today.

Are the projected savings realistic in light of what we've learned, and are all the elements of the plan necessary or even desirable? To what extent do these various program elements depend on each other, or can any of them be safely eliminated if it is determined that a better approach is available? These questions need to be answered objectively. It should be obvious that we can't keep changing course, and having set our course, we need to provide adequate funding to ensure that we'll reach our goal. However, we must not, out of stubbornness, fail to make necessary mid-course corrections.

I'm sure the witnesses who will be testifying this afternoon will be able to provide some interesting insight into these questions, and I look forward to their testimony.

Mr. LEWIS. Thank you, Mr. Chairman.

Admiral, just to stay with the chairman's thinking on this trust fund, this has always been a sore subject with me. I've so many times watched partially completed programs at airports waiting for money in the trust fund, and I've watched the trust fund continue to grow.

We charge this money on the—each passenger pays for this, but I notice that the budget now is increasing moneys from the trust fund from 49 to 75 percent, an increase of 26 percent, and this is like $2 billion of your FAA program; the 2.7 is coming out of the trust fund.

Now, this concerns me when I see that $65 million is going to be for your headquarters operation and 49 is going to come out of the trust fund.

Now, I can understand if you're going to need—you use a part of the money to operate what the trust fund was initially intended for, but you're not going to do that. You're going to use that money for other things as well, and the trust fund is paying for other things as well.

Now, you just said that you were going to be able to—you're dedicated to keeping in line and making sure the trust fund moneys are spent where originally intended, but it doesn't appear that way to me.

Admiral ENGEN. Well, Mr. Lewis, you know, in 1985 we had $923 million from the trust fund going to airport improvement, and we have in the 1986 budget $1 million—$1.0017 billion. Those come directly out of the trust fund for those kinds of things which you're talking about.

As far as the apportionment of the using of the funds, I'm sorry, I didn't come prepared to talk in detail about the trust fund, but I would like to leave with you fine gentlemen, my goal is to use the trust fund, and that's, you know—that's my goal.

Mr. LEWIS. But use the trust fund as originally intended?

Admiral ENGEN. As originally intended, and———

Mr. LEWIS. Airport improvement and development.

Admiral ENGEN. If I—if I come back to the headquarters dollars that we have appropriated right there, I—you know, much of what we do in the headquarters is attendant to aircraft safety and improvement of the system, and you can draw a parallel there, but I'm not prepared to do that today, sir.

Mr. LEWIS. I understand. I don't want to put you on the spot, Admiral.

Admiral ENGEN. I understand.

Mr. LEWIS. I just—you know, I just want to make my feelings strongly put.

I don't want a pile of money to sit there and, as the chairman said, have Mr. Stockman use it.

Admiral ENGEN. Yes, sir.

Mr. **Lewis**. And for other things, other than what it was intended for, and this has happened too often, or it hasn't been used, and it's just been allowed to grow for a number of years.

With your modernization of the flight service stations at this point, have you made any mass changes from your original intent?

Maybe Mr. Frisbie would want to respond, as I don't know, but you know, we get calls from all over about flight service, and I even—every time I go file a flight plan, I—these people are talking to me about they're either going to be closed or transferred, or, "We can't do without this," and that sort of thing.

Have you revised as you go along, or——

Admiral **Engen**. Let me address that, sir.

We have, as you know, a plan that was set in motion in November of 1980 by then-Administrator Bond and then modified by Administrator Helms, as we have gone along, a plan to go to 61 automated flight service stations, that is indeed our goal; and yes, I did come in, and I did—I did look at the program and how we were going to get from 1984 to 1991, and I saw that we had—in my perception, we had bitten off a little more than—than we could chew.

So I said, "We'll get to the same place, but I want to get there in a measured way." There may be some flight service stations out there that are more important from a weather phenomena standpoint than others, such as in a mountain, or on top of a mountain, or in a valley, or along a sea coast, where fogs or wind currents would rapidly change the weather.

Mr. **Lewis**. Or in central Florida.

Admiral **Engen**. And so we're looking at those kinds of things.

Right now—and we did modify the schedule, and we slowed it down, and right now we're scheduled to have 52 flight service stations in being, in addition to the 61 automated flight service stations, in 1991.

Now, I'm looking for those flight service stations which are the most needed, and I'm trying to prioritize them and to find out which ones are the most important ones.

You know, 96 percent of all the calls and all the briefings that we get from our flight service stations are on telephones, and we only have about 4 percent walk-ins, and it used to be we'd always walk in—and I know you have, and I have, too—to file a flight plan at a flight service station.

The figures have changed, and it's really—it's really dramatic, and so we're moving forward, trying to cater to that dramatic change, and we're trying to use the—the automated flight service stations.

I think you will find that the service will be equal or better, but probably it's going to be greatly improved.

Mr. **Lewis**. Well, following that, the current plan, Admiral, will be completed in 19—by 1992, I would say, and you say you are developing a comprehensive plan to—for the early decades of the next century.

Now, are you telling us that after developing—you are already developing a NAS plan No. 2, and how soon after the current plan is implemented will you begin implementing the additional modernization plan, or is it a continuation of NAS-1?

Admiral **Engen**. I'm going to let Mr. Albrecht say a few words on this when I finish, but I—you know, you can't stop planning. You always have to plan ahead, and, yes, the NAS is designed to take us into the 21st century, and to take us in and allow us to continue to operate for many years after that.

But you've got to look ahead, and you've got to begin thinking about other sensors—GPS, if you will, spacial positioning, technology changes, and we have to kind of stay ahead of it, and it's that advanced—advanced R&D effort that I'm very captivated with, because I don't want to be caught thinking that the NAS plan, as we do it in 1992, is going to be there in 2054, because it just won't. We've got to think way ahead.

Al.

Mr. **Albrecht**. Mr. Lewis, the NAS plan as we originally described it in 1981 and 1982 had almost 90 major programs, of which some 51 were fairly heavy drivers, and that program we're maintaining fixed. We're trying to identify it as a block that we will finish and we will complete.

As you've said, the problem doesn't stop there, and, post-1992 into the year 2000, there will be enhancements, there will be changes, there will be things we'll have to accommodate. One example, of course, is the use of satellite sensors.

We're trying to build the NAS plan basically so that it doesn't really care what kind of a sensor it uses, so that later on, when satellites such as GPS and other systems get to be operational, we can accept them without any major revision of the plan.

We expect to start an advanced R&D program in the next few years which will address the kinds of things that need to be taken care of in the out-years.

So we're doing two things: One, we're trying to contain the NAS plan so you can keep score and we can tell exactly how we are in terms of schedule and funding expenditures. At the same time, we're not blind to the fact that things will continue post mid-1990's, and we're trying to address those problems so we can report to the Congress.

Mr. **Lewis**. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. **Glickman**. Thank you.

Mr. Boehlert.

Mr. **Boehlert**. Yes, Admiral. I have the privilege of hearing you twice, because I'm now on the Aviation Subcommittee of Public Works, and I'll have an opportunity to go into greater detail on something that is of deep interest to me.

But let me ask you, were your decisions—the FAA's decisions—on the location of the automated flight service stations based, in essence, on the theory that you would go with the lowest responsive responsible bidder?

Admiral **Engen**. The simple answer—yes, sir.

Mr. **Boehlert**. So it was a cost-driven decision?

Admiral **Engen**. In October—on October 10, 1980, Langhorne Bond said that we were going to do, and then in 1981 Lynn Helms said we were going to do it by lower cost, and we have held to that low-cost principle. Yes, sir.

Mr. **Boehlert**. Because I remember Administrator Helms, who was very strong in his feeling that we should get the quality at the best possible price, and—well, then you, in your capacity right now, do you feel an obligation, when faced with alternatives fulfilling your important responsibilities, to decide in favor of the lowest cost alternative when all factors, other than costs, are equal?

Admiral **Engen**. When all—when everything is equal, I must let the lowest cost be the determining factor.

It was the way by which we determined 56 automated flight service stations. We have five more to go, and if I were to change that at this point in time, I would—I would not be consistent.

So I'm using cost as the determining factor, yes, sir.

Mr. **Boehlert**. Well, that's very important, and I agree with that, so—because I'm mindful, in your statement, you talk about the need to curb the Federal deficit. You say it's generated an unprecedented degree of fiscal scrutiny of every Federal program, particularly yours.

I am now subjecting some of your programs to that very same close scrutiny. So I look forward to working with you to guarantee that the FAA gets the best possible service for the lowest cost, and you can anticipate hearing some more from me on that very subject.

Admiral **Engen**. Thank you, sir. I look forward to working with you. Thank you very much.

Mr. **Glickman**. Mr. Packard.

Mr. **Packard**. Thank you, Mr. Chairman.

I, too, am privileged to work with you in more than one capacity, Admiral.

Last year in the Aviation Subcommittee on Public Works, we reviewed carefully the sunsetting of CAB. That took place as of the first of this year.

Have you noticed—or let me rephrase. What impact has that had on FAA and its operation, and has it in any way affected the safety of our aircraft or our air carriers now?

Admiral **Engen**. Let me answer that backwards, Mr. Packard.

First of all, no, it has not impacted upon safety, and I am dedicated to see that that will not happen.

To be—we're still working out some of the things that the CAB had. Secretary Dole and I are working together to ensure that those functions which go to the Office of the Secretary do indeed go to the Office of the Secretary and those functions which came to me come to me.

I had something like 5 or 6 percent of the CAB functions came to me, and, in those functions, I am making sure that safety is foremost in our minds, as it is throughout the entire agency.

Mr. **Packard**. Do you see any new technology on the horizon that will improve air safety and, at the same time, reduce costs of administering it?

Admiral **Engen**. I'm going to—I'm going to ask both Frank and Al here to comment on that, Mr. Packard, if I can.

I think, of course, we're always looking for increased safety, and unfortunately we generally find we have to pay for it either through trying to test it or—but I'm—I don't want to make a blanket answer, because I'm sure there's some way out there in which we can do some cost reduction and improve safety.

Let me ask Al if he's got anything.

Mr. **Albrecht**. Mr. Packard, that's a continuing process, thank goodness. We can do things today we couldn't have done a few years ago because of, as you know, the massive improvement in data processing capability. We can now do many kinds of things that would just have been prohibitive before.

I mentioned satellites earlier. I think satellite technology has come a long ways and will prove to be a very effective sensor in the future.

The NEXRAD Program, we hope, will provide the kind of Doppler radar that can do things that the simple radar couldn't have done a few years before.

So, yes, there are things that will help us improve our safety and reduce costs, and it's a continuing thing; it happens every few years.

Mr. **Packard**. Thank you very much for your testimony.

Mr. **Glickman**. Thank you.

Just a couple of questions.

One of the things that I've been concerned about, although the season is nearing the end, is the icing question and the coordination between the FAA and NASA on coming up with a deicing solution that is capable of some sort of standardization in terms of how it's applied to aircraft.

This, of course, was something that's bothered me since the Air Florida crash.

Have you—other than a circular—an advisory circular, have you done any more on this area?

Admiral **Engen**. The simple answer—yes.

This last—as soon as I left the Safety Board and went to the FAA, I endeavored to set up a cooperative deicing at the—one of the two airports—one of the three airports which the FAA owns, Washington National, and I endeavored to set up a procedure whereby we, for an economic fee, and through cooperative manning of mobile equipment, airplanes would be deiced at the throat before they take Runway 18 or 36.

It met with a lot of resistance from the individual air carriers, and I don't want to single out any air carrier, because I understand the resistance.

This came down on the part of legal issues and who's legally responsible, and one uses a 32-percent solution, and another one uses a 36-percent solution under given—given certain circumstances, and so I kind of—I put it down as something that we're going to try to do again in 1985, and I will be having a meeting in April—this next month—to set in motion again to try to do this at Washington National.

We're continuing our icing investigation, and that's something that's ongoing all the time.

Mr. **Glickman**. OK.

Well, we appreciate your being here and look forward to the testimony on the antimisting fuels, flammable seat-related issues, fire issues, when you come back in a couple of weeks.

Thank you very much.

Admiral ENGEN. Thank you, Mr. Chairman. Thank you, sir.

E&D & NAS PLAN

SUMMARY

SEI CONTRACT

STATUS

SYSTEM ENGINEERING AND INTEGRATION (SEI) CONTRACT

- AWARDED JANUARY 31, 1984, TO MARTIN MARIETTA
- SUPPORTS FAA IN NATIONAL AIRSPACE SYSTEM (NAS) PLAN IMPLEMENTATION
- 10-YEAR PERIOD OF PERFORMANCE
- COST-PLUS-AWARD FEE
  - FEE AWARDED EACH 6 MONTHS
  - BASED ON SEI PERFORMANCE AND ACHIEVEMENT OF NAS PLAN PROGRAMS/OBJECTIVES
- FRANK FRISBIE IS TECHNICAL OFFICER FOR SEI CONTRACT
- CURRENT STAFFING LEVEL ON SCHEDULE

PRINCIPAL AREAS OF SUPPORT

NAS PROGRAM MANAGEMENT -- ADL-2

- NAS PLAN AUDIT/UPDATE
- SCHEDULE, COST, BENEFIT, RISK ANALYSES
- PROGRAM CONTROL TOOLS
- NAS CONFIGURATION MANAGEMENT

SYSTEMS ENGINEERING -- AES-1

- DESIGN STANDARDS
- TOP-LEVEL SYSTEM DESIGN
- TRANSITION PLAN FOR IMPLEMENTATION

ADVANCED AUTOMATION -- AAP-1

- PROGRAM MANAGEMENT SUPPORT
- TECHNICAL SUPPORT
- SOFTWARE IV&V

PROJECT MANAGEMENT -- APM-1

- TECHNICAL SUPPORT
- ARCHITECTURAL AND ENGINEERING

ACCOMPLISHMENTS IN FIRST YEAR

NAS PROGRAM MANAGEMENT

- NAS PLAN AUDIT
- NAS PLAN 1985 UPDATE
- NAS SCHEDULE BASELINED
- NAS FINANCIAL ANALYSIS/BUDGET CORSSWALK
- NAS CONFIGURATION MANAGEMENT

SYSTEM ENGINEERING

- TOP-LEVEL NAS DESIGN BASELINED
- PRELIMINARY DESIGN REVIEW--NAS SPECIFICATIONS WITH PERFORMANCE REQ'MTS
- TRANSITION PLAN DRAFT
- SPECIAL STUDIES--TERMINAL DOPPLER WEATHER RADAR, LORAN C, TRAMWAY
- UPDATED DESIGN STANDARDS (SOFTWARE DEVELOPMENT, ELECTRONIC EQUIPMENT, ETC.)

ACCOMPLISHMENTS IN FIRST YEAR

ADVANCED AUTOMATION

- PROGRAM MANAGEMENT SUPPORT
- HOST TECHNICAL SUPPORT/TRANSITION PLAN
- AAS IV&V
- AAS TECHNICAL SUPPORT

PROJECT MANAGEMENT

- TECHNICAL SUPPORT TO OVER 20 PROJECTS (MLS, VSCS, FSAS, MODE S, ASR-9, ETC.)
- ARTCC BUILDING EXPANSION (A&E)

NAS

PLAN

WHAT

IS

IT?

NAS Plan Overview

- A Comprehensive Plan for Modernizing and Improving Air Traffic Control and Airway Facilities Services Through the Year 2000
- First Published in December 1981
  - UPDATED IN APRIL 1983 AND 1984
  - NOW IN APRIL 1985
- Plan Is Directly Linked to the Funding Authorizations in the Airport and Airway Improvement Act of 1982

NAS Plan Overview

Recurring Theme

Gains in Safety, Capacity, Productivity, and Economy Will Chiefly Be Realized by:

- Higher Levels of Automation
- Consolidations of Major Facilities
- Application of New and Lower Cost Technologies in Telecommunications

NAS PLAN AUDIT

PURPOSE OF AUDIT

- CONTRACTUAL REQUIREMENT TO AUDIT 1984 EDITION OF NAS PLAN
- CRITICAL REVIEW OF TECHNICAL FEASIBILITY, COSTS, SCHEDULES, AND BENEFITS
- IMPORTANT FIRST STEP BY SEI CONTRACTOR
  - DETAILED UNDERSTANDING OF NAS PLAN PROGRAM
  - INPUTS TO 1985 UPDATE OF NAS PLAN
  - KEYSTONE TO SEI CONTRACTOR COMMITMENT TO MISSION RESPONSIBILITY FOR NAS PLAN IMPLEMENTATION

NAS PLAN AUDIT

SUMMARY

- NAS PLAN AUDIT ACHIEVED ITS OBJECTIVES
- 51 MANAGEMENT RECOMMENDATIONS
  - 36 ACCEPTED
  - 13 PARTIALLY ACCEPTED
  - 2 REJECTED
- 160 TECHNICAL PROGRAM RECOMMENDATIONS
  - 135 ACCEPTED
  - 20 PARTIALLY ACCEPTED
  - 5 REJECTED
- MAJORITY OF RESPONSIVE ACTIONS ARE IN SEI CONTRACT AND ARE IN PROCESS
- NEW INITIATIVES WILL BE ASSIGNED AND TRACKED

NAS PLAN SCHEDULE CONTROL PROCESS

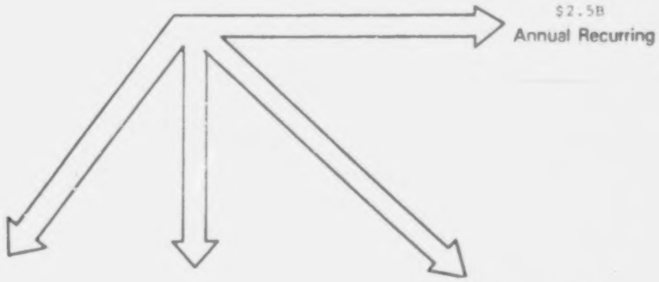
PLANNED (ADL/SEI):

- NAS PROGRAM (ALL PROJECTS) BEING ENTERED INTO SCHEDULE CONTROL SYSTEM
- MASTER SCHEDULE BASELINE TO TIE TO 1985 NAS PLAN
- FORMAL CHANGE CONTROL PROCESS BEING ESTABLISHED
  - NAS PROGRAM DIRECTOR CONTROLS 14 KEY MILESTONES FOR EVERY PROJECT
  - CHANGES MADE TO BASELINE ONLY AFTER FORMAL REVIEW AND APPROVAL
- AOA WILL REVIEW DMSA'S AND SCHEDULES AT PROGRAM REVIEWS
- AOA WILL RECEIVE MONTHLY STATUS REPORT ON ~~ALL~~ NAS PLAN PROGRAM PROGRESS AND QUARTERLY BRIEFING
- SEI WILL, PRESENT QUARTERLY REVIEW OF PROGRAM CONTENT AND SCHEDULES
- AOA APPROVES BUDGET FOR SUBMISSION
- AOA APPROVES NAS PLAN FOR ISSUANCE

Forecast of NAS Plan Commitments

(1983 - 1992)

$11.7 BILLION
Total Plan



EOY Commitment Status	$6.0B (Air Traffic Control)	$2.4B (Advanced Automation)	$.6B (SEI)	Weighted Average
FY 84	48%	100%	100%	65%
FY 85	78 %	100%	100%	86%

ACCOMPLISHMENTS

MIX OF RE&D/F&E

Mr. GLICKMAN. Our next witness is Mr. Frederick Hudoff, vice president and program manager of Martin Marietta Corp., and I would say to all the witnesses here that, now that we've heard from FAA, we're going to put a 10-minute rule on your testimony, and we will have a little bell that will ring, because we have a long load of witnesses today, and we need to conclude here by 4:30, if possible.

So your entire statements will appear in the record, and I realize this may press you—some of the witnesses—but I find usually that if witnesses are pressed, they're usually able to get more of their testimony done in a more effective way than if they have a longer period of time to do it. So it gives us time for questions.

Why don't you go ahead.

STATEMENT OF FREDERICK H. HUDOFF, VICE PRESIDENT AND PROGRAM MANAGER, AIR TRAFFIC CONTROL DIVISION, MARTIN MARIETTA CORP., WASHINGTON, DC

Mr. HUDOFF. Good afternoon, Mr. Chairman and members of the committee.

I am Fred Hudoff, vice president of the Air Traffic Control Division of the Martin Marietta Corp.

It is a pleasure to once again have the opportunity to appear before you to report on the past year's effort to status—and to status our ongoing efforts as the systems engineering and integration contractor for implementation of the national airspace system plan.

The last time I appeared, we were at a startup of our contract, the contract having been awarded the last part of January. We told you at that time what we were going to do. Hopefully, this time we will report on progress.

With your permission, I will submit my testimony for the record.

Mr. GLICKMAN. OK.

Mr. HUDOFF. And provide a brief summary of that testimony.

[Slide shown.]

Mr. HUDOFF. First, it's important to understand the role of the systems engineering contractor.

We perform for the FAA the systems engineering role that leads to an integrated system. That may be characterized by the design process that is undertaken at the time and a process implementation of integration methods to integrate this system.

We plan and conduct all of the system level testing both for the tech center and for the regions.

We support the FAA in our role—emerging role of technical direction of NAS plan projects, and what this is characterized by is putting the hooks into the system that assure that the systems engineering process flows down to the projects.

We have assisted the FAA in putting management controls into being such that costs, schedule, and benefits can be monitored regularly, and the context in which schedule slips, cost growth, and benefits erosion can be evaluated.

As Frank Frisbie said earlier, we have a unique opportunity to appear with the FAA with a partnership in helping achieve this objective, and we have a 10-year period of performance that allows the systems engineering process to encompass the entire life cycle of the development of the NAS plan.

[Slide shown.]

Mr. HUDOFF. I think it's important to recognize that at the time that we started this job, the FAA saw the need for us to transition rapidly, and they identified two significant tasks.

One was to audit the NAS plan and to become a partner in the assessment of its achievability, and then the other was to audit the level I design.

That may be characterized by an independent assessment of the design architecture that had been laid down by the FAA in MITRE and to baseline, if you will, a design process.

In addition, we had the routine of setting up a new headquarters by mobilizing that headquarters with tools and preparing license agreements, proprietary data disclosure agreements with all of the FAA community in terms of being able to carry out the systems engineering job.

[Slide shown.]

Mr. HUDOFF. Now as to some of the accomplishments, the level I design, which is a functional design of the system, has been completed, approved by the FAA, and baselined. What that means is that there is a tracking system in place now for change.

The level II design has evolved, and we have performed a preliminary design review of the level II design. What this is doing now is driving the design to add performance requirements to the system and provide a better base by which project compatibility can be achieved.

The level III design is literally an activation plan, or a transition plan, as how the system will be fielded. That has been completed through a PDR in the FAA, and we, together, are dispositioning off the actions out of that PDR.

The level IV design is a detailed design, an activation design, of building modifications necessary to house equipments. We are in the process of completing 15 different ARTCC sites.

[Slide shown.]

Mr. HUDOFF. The next chart continues with some of the accomplishments. I think that one important thing that the systems engineering process does is, it tracks the operational requirements and operational scenario of the system.

In turn, we, the systems engineering contractor, must assure, through our system, that all of those operational requirements are being incorporated into the design.

The FAA now are validating the operational requirements through their process, and we're assuring them functional compatibility with the design that's in place.

Interface control is an extremely important part of this complex system. There are over 1,000 interfaces to the system. They're both software interfaces and hardware interfaces.

A detailed interface control plan has been recommended, and we're in the process of implementing that. That control plan has been reviewed by the FAA through a PDR process.

I think the most significant thing that we're bringing to the FAA is a discipline of verifying and validating software-intensive type programs. A lot of the projects—most of the projects are heavily software intensive, and, through the process of the independent IV&V, we're mitigating through that process software risk.

Design standards is another accomplishment. We're updating all of the FAA's design standards, again, to mitigate risk.

The other areas of accomplishments--we're involved with the FAA in their logistics program for the NAS; the systems test planning for the NAS; and we've recently conducted several analytical studies on upgrade to specifically—is in the area of Loran-C, which is a new program in 1986, and the terminal Doppler weather radar, which is a planned program in the future.

[Slide shown.]

Mr. HUDOFF. Technical support and technical direction. We have staffed ourselves with 600 people. We have applied these people throughout the mainstream effort for the FAA, supporting Val Hunt's organizations, supporting Marty Poseski's organization, and getting the project acquisitions accomplished.

Now to the status of the NAS Program. We feel in the last year, as a result of our audit, we saw erosion in the schedules from the 1982 plan.

However, one thing has been accomplished, and that is, the erosion has slowed to a near stop. The management control systems are in place at the administrator's level, at the program director's level, Frank Frisbie, to catch, if you will, and anticipate schedule incompatibilities and slow that erosion.

Cost—again, our audit said that the costs were achievable but heavily tied to schedule slips.

There are a lot of influences on schedule, schedule being probably the highest risk part of the program. A lot of external influences on schedule, and therefore schedule being cost—cost-growth anticipated.

What we've seen is a containment of cost growth by the project managers, and I think the management systems are in place to now continue to assure this committee that—that the objectives can be carried out.

Benefits—I think another area that we've provided the FAA with—with tools is in tracking and make real the benefits. The benefits plan—the benefits model—has been evaluated by—by the GAO.

We find now that our plan is in place. We're tracking the benefits. We're providing the management of the FAA the context in which benefits are being eroded.

Risk—I think that risk is being mitigated through a lot of factors both put in place prior to our joining the team but now in place because we have joined the team, and I think that a critical part of that is seeing that every software-intensive project now is going through a very, very comprehensive and indepth review. This is a review of all contractors' effort as they develop their software.

[Slide shown.]

Mr. HUDOFF. NAS plan update—I've listed several items that are a part of the update to the 1985 program—or 1986 program; excuse me. These are all part of our continuing support to the FAA in integrating from year to year the plan.

[Slide shown.]

Mr. HUDOFF. Now in summary, Mr. Chairman, some of the highlights.

From my vantage point, the systems engineering process is in place; the management of the FAA is supporting that process 100 percent in their decisions; I feel it's working; it's working to help integrate this massive system.

I think that during the course of our last year, we have seen our integration role mature. We are beating specifications at the project level back against that system design. We're driving out issues. The issues are being tracked to a solution, and the FAA management is dispositioning off each of the items.

We think that the management systems are in place now to control cost, control schedule, control benefits—the three most important things to try to achieve the NAS plan goals and objectives.

Meeting the objectives, we think that in the 1986 plan, the 1985 plan, that the projects are meeting the stated objectives of the NAS plan.

We see a total commitment on the part of the FAA to make the schedule baseline. In fact, one of the things that I continue to admire is, when I step into a DMSA forum, one of the things that administrator does is, he—he controls schedule down to the last 15 days.

Achievable but at risk—the cost. If the program continues to slip to the right for funding reasons, I believe that the program's going to grow. We made an estimate of this of $2.3 billion.

We feel that continued slips to the program are going to drive the cost beyond the Administrator's commitment of $11.7 billion.

We think that the benefits are attainable—in fact, that there are additional benefits that have been derived that we are now starting to monitor for the FAA.

[The prepared statement of Mr. Hudoff follows:]

TESTIMONY OF FREDERICK H. HUDOFF

INTRODUCTION

Mr. Chairman, I am Frederick H. Hudoff, Vice President and Program Manager of the Air Traffic Control Division of the Martin Marietta Corporation.

It is indeed a pleasure to have this opportunity to once again appear before your Committee to discuss our role as the Systems Engineering and Integration contractor to the FAA for the implementation of the National Airspace System Plan.

During last year's hearings I provided a brief assessment of our roles and relationships with the Federal Aviation Administration, and discussed the programmatic aspects of the SEI contract as well as our organizational structure which was designed to complement that of the FAA's Development and Logistics organization.

Significant progress has been made during the past year toward the objective for which we were contracted; namely, to apply a strong systems engineering and integration process to the recognized and established expertise in Air Traffic Control that exists within the FAA. I am here today to report on this past year's progress and to status our ongoing initiative in support of NAS Plan implementation.

Upon contract award, and in order to effectively transition into our current role, initial emphasis was placed upon the development of the SEI Program Plan which provides the basic mechanism for applying a systems approach to NAS Plan implementation. Concurrent with the effort, and at the direction of the FAA, we commenced a six month effort to audit the NAS Plan in order to fully assess cost, schedule and stated benefits, as well as overall plan achievability. The audit probed to test the credibility and comprehensiveness of the NAS Plan's system engineering and management approaches, both of which are fundamental to achievement of its stated goals and objectives.

As the result of the effort, we found the NAS Plan to be well conceived for effecting an orderly modernization of NAS ground support facilities. Numerous recommendations for modification and improvement were made which will be more specifically addressed later in my remarks. It is our general conclusion that the NAS Plan as issued and refined each year, accurately defines the needs of the system. It provides workable approaches to remedy existing system problems and defines methods to safely produce an evolutionary growth in system capacity and capability.

In conjunction with the NAS Plan audit, and in order to assess the engineering and integration status, we were directed to conduct an audit of the existing Level I design, which establishes the NAS architecture. We were also to commence work on the Level II, III and IV Designs, which further define the NAS and provide for transitioning of NAS projects from concepts to operationally certified systems. As a result of the Level I design audit, we concluded that the system architecture contained therein was responsive to the NAS needs, but could be improved from a systems engineering standpoint. Recommendations regarding this issue are addressed later.

With regard to the current status of the NAS, it is my opinion that significant progress is being made in all functional areas. Considerable effort has been made to stabilize schedules, define programmatic interdependencies and develop effective control systems. The assumption of technical responsibility is proceeding ahead of schedule, reflecting the establishment of sound FAA/SEI managerial relationships.

My remarks today will provide an overall status of our Systems Engineering and Integration efforts to date as well as statusing the NAS Program.

TRANSITION

The SEI Program Plan is structured to clearly delineate the tasks, responsibilities and contractual roles of the FAA and the System Engineering and Integration contract team. I believe that among other objectives, the Program Plan has achieved its goal to put in place the mechanism for basic system engineering disciplines necessary to manage the NAS. It provides the structure upon which individual NAS projects can be woven into a more integrated programmatic fabric. We are now able to better recognize the interdependencies of various projects to form the systems that ultimately enhance the NAS capacity, safety, productivity and cost benefit goals.

By using this approach we can begin to evaluate and weigh NAS requirements in the context of a more integrated program design. We can trace the engineering design or capability back to a specific line-item-chapter-and- verse validated operational requirement. In short, we have a very good audit trail of why a project is spending money to achieve a specific capability in a project design. But equally important to achieving the NAS performance goals through the synergism of system engineering, we are prescribing how an individual project's design is to be interfaced with other projects to produce a total integrated program. As a result, we can now relate these program designs back to the NAS goals, and forward to procurement specifications, and have created a more manageable system for measuring NAS program performance.

As the System Engineering and Integration contractor to the FAA for modernization of the NAS, one of our initial contractual obligations activities was to audit the NAS Plan. The Plan was reviewed for airspace safety, technical feasibility and validity, schedule and cost credibility, benefit accruals, and methods of accomplishment. The audit included a comprehensive review of related plans and supporting FAA budgetary, system design, and implementation documentation.

Our audit was accomplished by independent teams of SEI personnel, free from any FAA influence on its results. However, we received extensive support from the FAA in obtaining factual information related to schedule, cost, benefits, safety, acquisition, usage, related planning, and supporting technical documentation.

The NAS Plan audit provided the cornerstone for assumption of mission accountability across our entire SEI team through identification and mutual agreement with the FAA on key issues, risks, recommendations and subsequent actions impinging on successful implementation of the NAS plan.

We found the NAS Plan to be well conceived for effecting an orderly modernization of the NAS. It accurately defines the needs of the system, provides approaches to remedy existing system problems, and defines methods to safely effect an evolutionary growth in system capacity and capability. However, our audit probed beyond these surface reflections, and as I initially stated, tested the credibility and comprehensiveness of the NAS Plan's systems engineering and management approaches. We confirmed our initial belief that the NAS Plan was technically feasible and within current technology.

We also conducted a parallel effort to audit the Level I Design document which was developed by the FAA immediately prior to our involvement as the SEI. We concluded from this audit that the system architecture contained therein was responsive to the NAS needs, but could be improved from a systems engineering standpoint. We made specific recommendations as a result of the audit to; (1) elevate the operational requirements developed by the FAA in conjunction with the MITRE Corporation to a higher level, and define them as system requirements, (2) separate functional requirements and incorporate them into the system specification and (3) develop a system level schematic diagram which would identify all subsystem interfaces and provide a means for identification of additional interface requirements for each of the NAS subsystems. Subsequent to the effort, we updated and re-published the Level I design document.

Throughout the past year one aspect of the FAA/SEI relationship has become increasingly obvious. We are able to effectively work to complement one another. The FAA has over the years developed a detailed technical expertise in air traffic control and airways facilities, and they have constructed a sound plan for the improvement and modernization of the National Airspace System. Following that lead, the SEI team has "brought to the table" the system engineering culture, disciplines and control mechanisms to effectively manage the NAS program engineering and integration effort. We have developed and put in place the engineering processes that are now being applied to achieve the capability goals embodied in the NAS Plan.

As we continue to exchange and blend these cultures, we are achieving the synergism that was expected of our partnership.

SYSTEMS ENGINEERING AND INTEGRATION STATUS

Due to the size and complexity of the NAS, and to impose a systems engineering discipline system-wide, the systems design effort has been divided into four elements: Level I Functional Design, Level II Allocated Design, Level III Transition Design, and Level IV Site Design.

In February 1984, we initiated an audit of the FAA Level I Design document. Between February and September we conducted two major reviews and modifications of this document. It was finally approved and we published the Level I Design document in October 1984. This baseline document develops an architecture that is responsive to the needs of the NAS community, and provides an overall description of facilities, equipment and their interdependencies. The design allocates functions to subsystems based on operational requirements contained in the NAS Requirements Documents.

The Level II Allocated Design quantifies the performance requirements for those systems contained in the Level I Functional Design. The design determines the quantities and locations of equipment, details system and performance requirements and identifies interfaces between the systems. The key document of this effort is the NAS System Specification which, after baselining later in the year, will serve as the source document for the project level specifications.

The Level III Transition Design specifies the integrated strategy for fielding the hardware and software provided by individual projects. Furthermore, it specifies the engineering requirements for hardware and software installation, test, support and training. The Transition Design also identifies the engineering, such as interim interface and performance requirements, necessary to evolve from today's NAS to the NAS of 1995. The key document of this effort is the NAS Master Transition Plan.

We completed the Level II and Level III Preliminary Design Review (PDR) in February 1985. The PDR was the vehicle used to review the allocation of system level functional requirements to subsystems, and to identify the yet to be quantified system and subsystem performance requirements. Additionally, the PDR provided the opportunity to review the overall system transition scheme. The key controlling documents, i.e., the NAS System Specification and the NAS Master Transition Plan are on a schedule which calls for their baselining later this year. Once baselined, these documents will form the technical bases for future NAS activities.

The Level IV Site Design has not reached the maturity of the other levels of design, because of its dependence upon the other designs. When complete, the Site Design will provide comprehensive plans for preparation of facilities to install, test and activate subsystems, equipment and software enhancements. To date, the designs for the Air Route Traffic Control Center (ARTCC) Control Wing Expansion have been accomplished for 15 of the 18 standard ARTCCs requiring expansion. The actual construction for several of the expansions is already underway.

Risk cannot be totally eliminated in a program as technically complex as the NAS. There are engineering processes, however, that can provide early warning of problems and facilitate analysis of internal or external influences. Among those disciplines we have put in place are: schedule control, verification and validation programs, interface control plans, engineering data bases, and design standards. A brief description of these applications follows:

The projects which make up the NAS Plan vary widely in terms of their complexity, development status, and the amount of integration, transition planning and test validation required to meet the prescribed operational milestones. To reduce the risk to schedules, benefits and budgets we have applied increased visibility and management attention to the projects that represent the most significant advancements to the overall NAS capability. Baselining of project schedules and control of specific milestones for these key projects has done much to stabilize risk at acceptable levels.

Independent Verification and Validation (IV&V) is our most effective way to ensure that complicated, advanced software programs will meet their designed specifications. The Advanced Automation System (AAS) and its software development is the single most significant risk to the NAS due to its complexity and leverage to other dependent projects. Our IV&V subcontractor, Logicon Corporation, is proceeding at good speed on this important software program as well as other selected highly complicated projects.

Interfaces proliferate the NAS Program. Well over 1,000 interfaces have been identified in the current NAS design. Functional and physical interfaces cut across many disciplines. Control of interfaces is a critical and monumental task. To better manage this program, we have developed an Interface Control Plan and established an automated Engineering Data Base. The effect of these initiatives is to fix responsibility for design and development of the interface, provide traceability between modes, and enhance compatibility to ensure cohesion and interoperability within the NAS system.

We also know that without proper Design Standards to control the development of hardware and software, we could easily end up with a variety of equipments performing the same function. This unnecessarily creates logistics, training, and other problems which drive up costs and reduce operational availability. We have developed design standards and will impose them on all future procurements. For those projects already underway, we will selectively apply the standards where benefits are best attainable.

The proper documentation of NAS operational requirements is the basis for all of the engineering disciplines, including the procurement specification. These requirements not only drive the Level I, II, III and IV Designs, they also permit validation and traceability of requirements to prevent over-design or "gold plating" in the procurement specification. We are working closely with FAA's operational requirements contractor, MITRE, to effect the proper documentation and validation of these operational requirements.

The NAS design is approaching technical maturity, but a lot of work lies ahead. We will continue to refine the design to ensure that it reflects the dynamism of the NAS itself.

NAS PLAN MANAGEMENT STATUS

In NAS Program Management, progress has been made in financial management, benefits analysis, schedule control, and program performance analysis as a direct result of SEI audit-related tasks. Extensive interaction is continuing within the FAA and SEI technical cadre to ensure that the evolving programmatic control processes are appropriately structured to realistically capture, analyze, and display meaningful status data. In addition, one-on-one sessions, briefings, and reviews are being used to provide maximum participation of key personnel in the development of program control processes which both the FAA and SEI can embrace.

Considerable initial effort has been underway, including establishment of tool user groups to accelerate tool availability. These user groups proved extremely helpful in integrating the issues of tool user, data custodian/collector, and the tool developer. Since the challenge is to develop a common set of tools for use across all programs/projects and to have a capability to apply them at various levels, an extreme amount of care and coordination will be mandated.

There has been a considerable effort to stabilize the NAS Program schedules. We are in the final steps of establishing a coordinated Master Schedule baseline which is consistent with the 1985 NAS Plan schedule requirements. Critical to establishing this baseline is getting to a point in time where all of the schedules can be synchronized and are supportive of the program schedule requirements.

The key milestone in this baseline development has been the definition of interdependencies between the projects and the coordination of these dependencies in order that they will be compatible with the affected projects. We have a dependency definition now assigned throughout the NAS program, and we are now able to specifically describe and analyze the critical activities which will control the accomplishment of the NAS program objectives. We are progressively refining these dependencies and through a combined effort between our schedule control function and our transition design effort, we will be able to forecast impacts for schedule performance in a timely manner to support management control actions.

A schedule status technique has been initiated which will provide us with the timely alert to adverse schedule performance. This schedule status technique will be beneficial to the management of schedules during this forthcoming year. Our milestones within the schedule system are related to points in time where benefits can be realized and are directly traceable to individual projects. Forecasting benefit achievements based upon near term schedule performance can be accomplished with improved accuracy.

Emphasis has been placed upon an in-depth schedule and cost analysis of those projects which are designated for specific management attention by virtue of cost or special significance. We have continued to provide a higher level of tracking to these projects to assure that the schedule performance of these other projects does not impact the performance of the NAS programs.

We believe that we have an effective control system for the management of schedules. It has taken the greater part of this past year to tailor it to the FAA management of the NAS Plan. We now are confident that we are able to contain the elements that in the past have been responsible for slipping the NAS Program schedules.

SEI Project Management now has responsibility for 38 NAS Plan projects throughout the SEI contract time frame. Currently, 28 projects are active through FY 85, and the remainder will start later this year and at the beginning of FY 86. SEI Project Management responsibilities are tailored to the unique requirements of each NAS project, and range from project Technical Monitor to Technical Support and Technical Direction. This is consistent with and supports the immediate and long term FAA needs. We continue to accelerate the move from Technical Monitor through Technical Support to the direction responsibility.

The SEI assumption of technical direction responsibility has been a particularly notable demonstration of the FAA and SEI partnership I mentioned earlier. This phase-in has occurred as a result of the process wherein the FAA and SEI project managers work as a team with the system or subsystem contractors toward the common objective of integrating the project into the NAS program. Through this process, all aspects of project's cost, schedule, configuration, logistics, integration and test are considered in regard to the impact on the total NAS.

Following FAA's lead, we are levying extraordinary pressure on the project managers and contractors to adhere to project schedules and to meet the dates for key events such as contract award, preliminary and critical design reviews, and first article delivery. We've jointly agreed to baseline a project schedule in conjunction with the issuance of the 1985 NAS Plan that reflects both the realities of the current development activity, and also the funding levels for each project. We are in large measure reliant on this schedule in our allocated and transition designs since these designs are composed of numerous interdependent projects. As we progress toward achieving the NAS benefits, it becomes increasingly critical that these projects proceed according to plan, since the benefits do not accrue unless all the parts are available to make the system work as it was designed.

Major areas of our integration activity have been in independent verification and validation of the Advanced Automation Systems software and architectural and engineering support for the ARTCC building expansion program. We are also providing strong systems engineering influence to the Advanced Automation System, Automated En Route Air Traffic Control, Voice Switching and Control System, Next Generation Weather Radar, Central Weather Processor, and the Automated Flight Service Station projects. This technical support will continue at an expanded level in FY 1985.

Project management remains sensitive to their role in providing technical and management expertise to ensure proper program verification, validation, and integration. Our project management personnel were active participants in providing technical depth and leadership, complementing FAA management personnel. Our working relationship with the Hazeltine Corporation was instrumental in developing a mutual understanding of the Microwave Landing System (MLS) requirements and design approach.

Our audit of the NAS Plan and its associated NAS Plan estimates found that the estimated costs were sufficient to perform the NAS Program as then defined. Subsequent to the audit, changes have been identified by the FAA. The associated cost impacts have been assessed and a determination made as to whether they could be incorporated within the plan estimate. It is our opinion, based upon trade studies of change-related cost increases and decreases, that the program, as currently defined, will be accomplished within the $11.7 Billion.

As the various projects are maturing and their respective costs are better understood, it has become apparent that a need exists to emphasize program level controls as well as system and project level controls. To this end, cost tools are nearing completion which will supply decision making data to all levels of the program. Emphasis is on early detection of risk to cost due to changes in schedules, technical performance and/or configuration. As the program continues to mature, these tools will supply living data to management, depicting the health of the NAS Program.

We are also providing decision support information relevant to achieving reductions in FAA operations costs as well as improving cost and safety benefits to NAS users. Our audit concluded that the overall goals of: (1) doubling air traffic control productivity, (2) reducing maintenance staff by one-third, and (3) maintaining total operations costs at 1980 levels by the year 2000, thereby saving nearly $18 Billion in FAA field operations costs, were realistic and achievable.

We have also begun the processes required to successfully achieve these goals. These include: (1) continuing improvement of the traceability of these goals to specific project actions which will provide the functional enhancements, (2) incorporation of mutually agreed upon detailed goals with region managers, project managers, and air traffic control and airway facility central managements, (3) increased emphasis on schedule management to preclude further schedule erosion and loss of benefits, and (4) increased emphasis and understanding of the benefits to users including cost and safety.

A number of significant accomplishments highlight our activity during our first year as the Systems Engineering and Integration Contractor. They cover a broad activity spectrum, from technical performance, to program management, to our own internal management of the contract. All are oriented toward our ultimate goal of meeting the NAS objectives. Let me describe a few examples from a long list of this year's accomplishments to demonstrate what we contributed to the NAS modernization effort and how we fulfill our mission accountability role.

Significant accomplishments have occurred in the areas of logistics and training. We were instrumental in establishing the FAA integrated logistics support program, which will consolidate multiple FAA efforts into a unified and interactive process. We prepared a draft logistics program order and a draft NAS integrated logistics support (NAILS) steering committee charter. These documents establish a NAILS program, and the requirements, guidelines, and responsibilities for program implementation to be applied to all phases of new and replacement systems.

We have been active in the Logistics Working Group identifying logistics requirements and performance interfaces with the NAS. Our maintenance concept was presented in a series of FAA maintenance meetings, and implementation of this concept, as applied to central repair facilities, will result in a cost reduction to the FAA of approximately $10 million. This decision was implemented in August 1984.

We have conducted in-depth reviews of the NAS master test plan and the integrated verifications requirements plan, with both FAA and SEI personnel. The results of these reviews formed the basis for many of the concepts used in FAA test policy definitions. Project support of Microwave Landing System (MLS) software design requirements identified a major problem in the approach being used for MLS software integration testing. This effort averted a potential cost and schedule impact during the integration test phase and contributed to the development of a more usable test methodology.

We have increased our emphasis on critical-path recognition, by development of a critical-path schedule of NAS projects that control implementation of NAS programs. We use this engineering process to provide an in-depth, integrated analysis of all NAS projects. The validation and proper flow or programmatic dependencies of the NAS projects are now within our automated data base, providing the capability for continued critical-path analysis.

We have placed special emphasis on our planning and reporting activities to aid in the improvement of schedule implementation, schedule baseline control, and customer visibility. These enhancements were implemented into the automated scheduling system as the planning group continued to improve on their reporting to the FAA using the new schedule baseline control system with the FAA.

With regard to NAS implementation objectives, NAS program financial management status has been enhanced by establishing a common understanding among all FAA financial organizations for NAS cost reporting. During this period, our cost management group developed an ad hoc report on FAA Headquarters and regional obligations by project code. This report allows the NAS cost management group to report regional obligation status on a monthly basis.

In addition, we believe our NAS program benefits analyses have made significant contributions toward establishing a baseline of FAA operational cost goals. The cost-reduction goals resulting from NAS Plan implementation, were developed through the compilation, validation, and management reviews of data. The review and broad acceptance of these cost-reduction goals enables the FAA to provide continuous decision support through the 1985 NAS Plan update and FY 1986 budget development processes. We continue to provide an important focal point, supporting inquiries by NAS program management and other government agencies.

SUMMARY

In summary, the first full year of our contract has produced positive results. The Systems Engineering and Integration contract is under control. Effective management systems are in place and operating. We have conducted an orderly manpower buildup and staffing is on track. The integration role continues to mature. Martin Marietta's Corporate commitment remains strong. Relationships with FAA continue to develop, with counterparts established and professional working relationships in place. Areas needing improvement have been rooted out and corrective actions are being taken. It has not been an entirely smooth road. The mixing of our two different cultures, i.e., the operationally oriented FAA with the system engineering oriented SEIC, has caused significant adjustment on both sides. That problem is behind us now. The systems engineering process is in place and producing excellent results. Finally, the NAS modernization is a long term, ten year effort to preclude technological obsolescence. Long-range planning, modified by yearly updates to the plan, will ensure that NAS benefits and objectives will be met and the systems will be able to safely accommodate the growth in air traffic. Your continued participation and support in providing for the technological research and development of facilities and equipment will go a long way toward ensuring a safe and efficient National Airspace System for our future.

Thank you.

Martin Marietta Corporation Air Traffic Control Division

Frederick H. Hudoff
Vice President and Program Manager

March 19, 1985

MARTIN MARIETTA

System Engineering and Integration Contractor – Transition Plan

- Air Traffic Control (ATC) System Engineering and Integration (SEI) Headquarters Mobilized
- Liaison Agreements with FAA Contractors in Place
- Program Plan Complete
  - — Defines Role and Process
  - — Programmatic Structure
- Performed Audit of 1984 National Airspace System (NAS) Plan
  - — Achievable
  - — FAA Accepted Results
  - — Disposition of Actions on Track
- Performed Audit of Level I Design
  - — Significant Expansion Was Accomplished
  - — FAA Approved Our Findings
  - — Baselined in October 1984

MARTIN MARIETTA

System Engineering and Integration Contractor – Role

- Perform Role of Systems Engineer for NAS Program
- Perform Systems Integration
- Plan and Conduct System-Level Integration Tests
- Provide Technical Direction of NAS Projects
- Perform Management Control
  - — Schedule
  - — Cost
  - — Benefits
- Assume Mission Accountability
- 10-Year Period of Performance

MARTIN MARIETTA

System Engineering and Integration Contractor – Accomplishments

- Level I Functional Design
  - System Architecture
  - Complete and Baselined
- Level II Allocated Design
  - System Specification
  - Completed Preliminary Design Review (PDR)
- Level III Transition Design
  - Master Transition Plan
  - Completed PDR
- Level IV Site Design
  - Specific Facility Plans
  - 15 Completed

MARTIN MARIETTA

System Engineering and Integration Contractor – Accomplishments (concl)

- Operational Requirements
  - Functional Compatibility
  - Under Review
- Interface Control Plan
  - Requirements Control
  - PDR
- Independent Verification and Validation
  - Software
  - 3 Systems in Work
- Design Standards
- Logistics and Training
  - Consolidated Repair Facility
  - Integrated Training Plan
- Systems Test Plan
  - Integrated Test
  - In Coordination
- Special Studies
  - Cost-Effective Solutions
  - Impact on NAS Goals
- Technical Support and Direction
  - Cooperative Effort
  - Accelerated SEI Role

MARTIN MARIETTA

Current NAS Program Status

- Schedule
  - — Erosion Slowed
  - — Objectives Still Achievable
- Cost
  - — Current Projections Achievable
  - — Possible Growth
  - — Contain Cost by Programmatic Actions
- Benefits
  - — Validated Original Benefits
  - — Influenced by External Factors
  - — Erosion Possible
    - —Project Implementation
    - —Facility Consolidation
- Risk Control
  - — Low Risk Technology
  - — Control Interfaces
  - — Critical Path Analysis
  - — Management Review of All Critical Programs
  - — Specification Compatibility Analyses
  - — Independent Verification and Validation
- NAS Plan Update
  - — Incorporates Audit and Design Refinements
  - — Four New Projects
    - —Offshore Data Processing
    - —Sustain NY TRACON
    - —Replace Long-Range Radar
    - —Loran-C
  - — Remains Feasible and Valid

MARTIN MARIETTA

Summary

SEI Contract

- System Engineering Process in Place and Producing Results
- Integration Role and Technical Direction Role Maturing
- Management Systems and Tools in Place
- Staffing on Track

NAS Program

- Meeting NAS Objectives
- Management Committed to Baselined Schedule
- Achievable within $11.7B, But at Risk
- Benefits Attainable

Mr. **Glickman**. Is that it?

You're terrific.

Now, if you manage the system that well, I'd tell you, we're going to be in business.

Mr. **Hudoff**. That's the systems engineering process, Mr. Chairman. [Laughter.]

Mr. **Glickman**. I wonder; you heard the testimony of the Administrator and the problems that he's had with the Office of Management and Budget in getting funding to continue on a—on a plan in which it was anticipated that it would be on.

Is it possible to continue to slide the programs, to delay the programs, and still hold to the original plan of $11.7 billion for the NAS plan?

Mr. **Hudoff**. Well, I think that, from what I've seen in the last year, that the FAA has done its best to take the slack out of the system and juggle the programs in order to keep it on track. I think we're at the limit now.

I think a continued slip to the right, because of funding limitations, is going to have a very noticeable effect on achieving the objectives of the NAS plan.

Mr. **Glickman**. In what areas do you see the greatest risks to the NAS plan's success? Is it in technical costs? or schedules? safety? benefits? new technology that may be coming on board that was unanticipated?

Mr. **Hudoff**. Let me try to give you two views.

In the audit of the NAS plan, we felt that technically the goals would be achievable with the architecture that had been proposed by the FAA and that they were using technology that was state-of-the-art but not undue risk in terms of the safety of its implementation.

I feel that the major risk to the overall program is a combination of—of schedule, but as schedule slips to the right, costs are going to grow, and the benefits will obviously not be achieved.

So I think the greatest risk, bottom line, is schedule right now.

Mr. **Glickman**. What about technology?

Mr. **Hudoff**. We've assessed, on several different occasions now, the technology that is being applied. There's a tradeoff between low-risk technology and existing state of the art versus taking a gamble on a technology of the future and incorporating in that system that technology.

It was our conclusion as a result of the audit that the right technology had been employed by the FAA in the system acquisition.

Mr. **Glickman**. And what about adaptability to new technologies—for example, satellite technology that ultimately may have an impact in moving airplanes around?

I just want to make sure the system is as suitable as it can be to—to adapt and to be modified in the years to come.

Mr. **Hudoff**. Several times GPS has been mentioned. One of the tasks that we have ahead of us is to study the impact of GPS on the program.

We feel that—that adequate provisions are being made through interfaces and in the software implementation to accommodate new sensors. You see that in weather; you see that in navigation.

So, yes, I believe that—that through a very disciplined interface control process, through a very disciplined process of design reviews where emphasis is placed on growth, I think that can be accomplished.

Mr. GLICKMAN. I originally felt that the SEI contractor came on board about 2 years late. I wonder what have you been doing to overcome this late start.

Mr. HUDOFF. The bottom line is, it's been tough. Let me characterize that by saying that the normal life cycle of the program is to do the entire program in a systems engineering way.

What we found is the merging of two cultures—a strong culture in air traffic control and a strong culture, quite frankly, in systems engineering. We've had our share of difficulties between us in both accommodating each other.

We started late. However, we have laid plans on, and the FAA has agreed to accelerate some of our efforts. We're more heavily involved in project support. We've accelerated the design review process. We're accelerating the interface control process to adapt now to a living systems engineering while these projects are already in the pipeline and under way, and we see that, while being difficult, we think that we can achieve the objective of a systems engineered NAS plan.

We think that the major area ahead of us is in a phased acquisition—phased activation of this—of the various systems, and the transition plan right now is the pivotal point in that process.

So we think that, while we got started late, the FAA and we have accelerated our process. As the Administrator said earlier, we have 600 people on board; we have a tremendous capacity with our team to be able to accelerate further; and the FAA has been kind enough to allow us to go do that in critical area.

Mr. GLICKMAN. OK. Well, we appreciate your testimony.

I would just say that we're holding the FAA accountable; we're also holding you accountable, because, together, you two are the ones responsible for making sure that the taxpayers get their money's worth in terms of an air traffic control system that is modern, and efficient, and safe, and, you know, we'll just be watching you all real—as we have been in the past—carefully, but we appreciate the fact that you seem to be on target and doing a good job to date.

Mr. HUDOFF. Thank you, Mr. Chairman. I hope to see you again in a year.

Mr. GLICKMAN. OK. Thank you very much.

We have a series of votes now. I'm going to guess it's going to be 20 or 25 minutes before we're able to come back.

[Recess.]

Mr. GLICKMAN. Mr. Pyle, it's a pleasure to have you here. We're sorry for the delay, but House votes sometimes come unexpected. So why don't you go ahead and proceed.

STATEMENT OF JAMES T. PYLE, MEMBER, AIRCRAFT OPERATIONS TECHNICAL COMMITTEE, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, WASHINGTON, DC

Mr. PYLE. I'm used to the process, Mr. Chairman, and I'm glad to be here.

Mr. Chairman, my name is James T. Pyle. I'm retired after 50 years in airline general aviation and military as well as Government aviation.

I'm an associate fellow of the American Institute of Aeronautics and Astronautics [AIAA] and a member of its Aircraft Operations Technical Committee, whose opinions I will represent to you today.

The AIAA is a nonprofit technical society with an international membership of over 35,000 professionals representing the aerospace industry, academia, and Government.

To further scientific and technical advancement, we have 51 technical committees covering every aspect of the aerospace profession.

Mr. Chairman, before I get into the statement, I'd just like to say one thing—that, having testified for a number of years as an Administrator and a Deputy Administrator of the FAA, I've a lot of nostalgia coming back here to appear before you today. It's a real privilege, and I thank you for the opportunity.

If it meets with your approval, Mr. Chairman, I'd like to submit the paper prepared by our committee "Review of the National Airspace System Plan [NASP]" for the record, and, in the interests of time, I'll just highlight a few of the points.

Our committee does consider the National Airspace System Plan as a quantum leap forward in upgrading the ATC system to meet the needs of civil air—civil aviation—air carrier and general aviation—and the military users of the airspace.

We think there's ample evidence of extensive, comprehensive planning, and the concept of having a system contractor to ensure orderly implementation in the procurement and installation of a tremendous amount of sophisticated equipment is eminently sound, and I understand that this committee has a lot to do with having set that up, and I commend you; I think it's terrific; and I was delighted to hear the testimony of the previous witness, because I think it sounds like they're on the right track.

As to the points, I think we'd like to point out one thing. This plan is basically, in the vernacular, a facilities and equipment document, or an F&E shopping list, and we urge the FAA to set forth the operational requirements of the system.

I understand that such a document is forthcoming, and I'd just say, the sooner the better, because that is basically needed, and I'll explain a little bit further on why.

Equally important is the need for a comprehensive research and development plan. Again, under preparation, but the aviation community needs it as soon as possible. It must cover the short-range as well as the long-range needs, and as the NASP is implemented, the operational requirements for improvements and updating will develop, and this will, in turn, call for necessary research and development to ensure that the ATC's system remains current and in tune with its needs.

This, in turn, will identify the F&E installations, and it becomes a smooth, orderly process if done in this manner.

The third point I'd like to make: It is pertinent to point out the backdrop against which these comments are made. The FAA's own statistics are revealing. Air carrier passengers will rise from 336 million in 1984, at an annual rate of 4.5 percent, to 573 million in 1996, and that's only 12 years off.

Commuter boardings will go from 23 million in 1984 to 54 million in 1996; takeoffs at tower-operated airports from 57 million to 92 million; and aircraft handled by centers from 31.6 million to 45 million in the same period.

This is not frightening, and doesn't concern me; but it is sobering and, I think, indicative of the need for an orderly process of identifying operation requirements, to an orderly research and development program, a system design program, implementation planning, and continued input from the user community, and, I would hope, the constant support and constructive input from the Congress, in general, and this committee, in particular.

The fourth point: One of the greatest constraints on the system today is the lack of adequate runway capacity. You can have the most fantastic system to handle the traffic in the air, but unless you can land them in a smooth flow, you end up with a stack.

It's sort of the opposite of the railroad operation with two or four tracks feeding the multiple tracks to the terminal. We just do it backward. We have an almost infinite number of tracks feeding into one, two, or, at the most, three runways at terminals.

The fifth point: We very much applaud the development of time-based 4-D navigation, starting with the en route metering system. This approach offers a lot in terms of improving the system efficiency. We hope it will be pursued enthusiastically.

I would remind you, we have smart airplanes in the fleet today which could operate right now in a 4-D environment. We're not quite ready for it, and I just hope the FAA will pursue this energetically.

The sixth point—we need better communications in the terminal area, and I think—I would hope that the data link would be implemented, and quickly. ACARS may be a fallback system that the airlines use—whatever.

From a personal viewpoint as a pilot, I would like to see more effort on providing the pilot with pertinent traffic information. Not only is it an added safety measure, as are his eyes in good weather, but as a backup in the case of a system failure or breakdown. We call it Cockpit Display of Traffic Information—CDTI.

After all, the pilot is an integral part of the system. He can be a participant—but he's not a servomechanism—if he is provided with the pertinent information and the proper format. This, in turn, becomes part and parcel of a sound, feasible, collision-avoidance system—CAS.

I think there's a lot of work that ought to be done there, and I would hope that it would be updated in the FAA's R&D Program.

The importance of user input cannot be overemphasized, both as the plan is being implemented and as the R&D progresses for updating the plan.

The NAR concept and approach is excellent, and I gather it is being initiated in the second phase, and I—we in the committee are all in favor of that.

I'd like to emphasize two final points. The plan is a total concept and, as such, must be funded as a whole. Elements are interdependent, and the omission of any particular element could have a cascade effect on the overall operation of the system as a whole.

Congress and the FAA must work closely together to assure an orderly flow of the necessary funds.

In short, we feel that full and uninterrupted funding of NASP is mandatory, and I think Mr. Hudoff hit the nail on the head in his statement and his testimony. I think it's extremely important, and I would hope your committee would address a lot of attention to this very point.

Now, one last point which we would like to make, and that is the necessity of an overview committee. I'm not sure that's the proper name. We don't know what the format is, but we'd like some mechanism that could provide continuity, that could provide perhaps oversight, and could be a resource to both the Congress and the agency.

I don't think an advisory committee, per se, does the job. They, all too often, make a lot of reports, and there's a lot of talk, but there's not much action. I want something that is really effective. That's what our committee has in mind.

And I would only call your attention, in conclusion, to our recommendations on pages 12 and 13 of our document, because they wrap it all up.

I'd like to end by expressing our committee's appreciation for the opportunity to appear before you. If there's any way we can be of assistance to you and to the staff, we would welcome it. After all, Mr. Chairman, I've worked with Scotty for over 25 years, and I'd like more of the same. So if we can help you, we'd be willing.

[The prepared statement of Mr. Pyle follows:]

PREPARED STATEMENT OF JAMES T. PYLE

My name is James T. Pyle; I am retired after 50 years in airline, general aviation, and military as well as government aviation. I am an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and a member of its Aircraft Operations Technical Committee, whose opinions I will present to you today.

The AIAA is a non-profit technical society with an international membership of over 35,000 professionals representing the aerospace industry, academia and government. To further scientific and technical advancement, we have 51 technical committees covering every aspect of the aerospace profession.

If I may, I should like to say how honored I consider myself to appear before you. It brings back pleasant memories of almost 30 years ago when I as the last Civil Aeronautics Administrator worked closely with the predecessor Committee on the problems of that administration, and particularly hard on the drafting of the Federal Aviation Act of 1958 which established the FAA; I served as its first Deputy Administrator. I have a lot of nostalgia as I sit before you here today.

If it meets with your approval, Mr. Chairman, I would like to submit the paper prepared by our Committee--"Review of the National Airspace System Plan (NASP)"--for the record. In the interest of time and brevity, I shall try to highlight what we feel are the most important points we made in the paper.

Our Committee considers the National Airspace System Plan (NASP) as a quantum leap forward in upgrading the Air Traffic Control (ATC) system to meet the needs of civil (air carrier and general aviation) and military users of the airspace. There is ample evidence of extensive, comprehensive planning, and the concept of having a System Contractor to ensure orderly implementation (procurement and installation of a tremendous amount of sophisticated equipment) is eminently sound.

At the same time we would like to point out that this Plan is basically, in the vernacular, a Facilities and Equipment document, or F & E shopping list, and we urge the FAA to set forth the operational requirements of the System; I understand that such a document is forthcoming--the sooner the better. After all, the operational requirements basically determine the needs for the Facilities and Equipment contained in the plan.

Equally important is the need for a comprehensive Research and Development plan--again, under preparation, but the aviation community needs it as soon as possible. It must cover not only the short range immediate needs, but even more important, the long term. As the NASP is implemented, operational requirements for improvements and up-dating will develop, and this will call for the necessary Research and Development to ensure that the ATC system remains current and in tune with its needs; this in turn will identify the F & E installations necessary to enable the system to meet the stated requirements. It is really a constant process which must flow smoothly, as I am sure you can appreciate from your background in this whole area of concern; now is the time to get it started.

It might be pertinent to point out the backdrop against which these comments are made. FAA's own statistics are revealing: air carrier passengers will rise from 336 million in 1984 at an annual rate of 4.5 percent to 573 million 1996--only 12 years off! Commuter boardings will go from 23.2 million in '84 to 54.2 million in '96; takeoffs at tower-operated airports from 57 million to 92 million, and aircraft handled by centers from 31.6 million to 45 million in the same period. Not frightening, but sobering, and indicative of the need for an orderly process of identifying operational requirements, research and development, system design, and implementation planning, with continued input from the user community, and I would hope constant support and constructive input from the Congress in general, and this Committee in particular.

Our concerns are set forth on Page 4 of the paper I have submitted. We would particularly call your attention to the need for an integrated airport system plan. One of the greatest constraints on the system today is lack of adequate runway capacity. You can have the most fantastic systems to handle the traffic in the air, but unless you can land them in a smooth flow, you end up "stacking" them in the airspace with attendant unavoidable delays. It's the opposite of the railroad operation--two or four tracks feeding into multiple tracks at the terminal. We're just the reverse; an almost infinite number of tracks feeding into one, two or at most three runways at the terminals.

One aspect of the overall concept we particularly applaud is the development of time-based or 4-D navigation--starting with the enroute metering program. This approach offers a lot in terms of improving the system efficiency--we hope it will be pursued enthusiastically. I would remind you we have "smart" airplanes in the fleets today which could operate right now in a 4-D environment, but the system is not as yet up to handling them. I realize the FAA is working on it; we urge that it keep plugging away at this one.

In the terminal area, better communications are a must--the data link offers much; it should be pursued. The airlines' ACARS system is a good one--maybe they could get together in some practical fashion, as we did with long range radars with the military. From a personal viewpoint as a pilot, I would like to see more effort on providing the pilot with pertinent traffic information, not only as an added safety measure, as are his eyes in good weather, but as a backup in the case of system failure or breakdown. We call it Cockpit Display of Traffic Information (CDTI). After all, the pilot is an integral part of the system; he can be a participant (and not a servo-mechanism) if he is provided with the pertinent information in the proper format. This concept is part and parcel of a sound, feasible Collision Avoidance System (CAS); we have a lot of work ahead of us to get a workable system in being. I think it might enjoy a higher priority in the FAA's R & D program.

The importance of user input cannot be over-emphasized--both as the Plan is being implemented, and as the R & D progresses for updating the plan. We urge the FAA to provide the users with a periodic technical review as to the progress being made. The National Airspace Review (NAR), now just about winding down, was first-rate--more of the same on a continuing basis is urged.

Two final items--the Plan is a total concept and as such must be funded as a whole--elements are interdependent and omission of any particular element could have a cascade effect on the overall operation of the system as a whole. Congress and the FAA must work closely together to assure an orderly flow of the necessary funds; in short, we feel that full and uninterrupted funding of NASP is mandatory.

Lastly, the necessity of an Overview Committee, or permanent Advisory Commission, described on pages 10 and 11, is considered important by our Committee. We feel such a group would be a valuable resource to both the FAA and to the Congress to ensure we are all marching in the right direction, and it would provide a mechanism to make certain that there is continuity from Administration to Administration. The form could be worked out, but the emphasis must be on a constructive body, and not just another Advisory Commission with a lot of talk, lots of reports and no action.

In conclusion I would call your attention to the Recommendations--pages 12 and 13--they wrap it all up--and we think they make sense; I commend them to you for your consideration.

I want to express our Committee's appreciation for the opportunity to appear before you. If there is any way we can be of assistance to the Committee and its staff, I would hope you would call on us. Thank you, Mr. Chairman, and Gentlemen.

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (AIAA)

TECHNICAL COMMITTEE ON AIRCRAFT OPERATIONS

POSITION PAPER

"REVIEW OF THE NATIONAL AIRSPACE SYSTEM PLAN - NASP"

December , [illegible]

FOREWORD

In its review of the National Air Space System Plan (NASP), the AIAA Technical Committee on Aircraft Operations submits this position paper as an overall endorsement of the plan concept. However, in so doing the Committee wishes to reserve judgement in 2 vital areas which it wishes to pursue further. These are:

1. Importance of the role of an Overview Committee

2. Research and development in support of the National Airspace System

The Committee needs more time to examine these areas, which it views as particularly critical to the success of the NASP. The Committee plans to address the 2 areas of concern as its next project and report is findings and conclusions during 1985.

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (AIAA)
TECHNICAL COMMITTEE ON AIRCRAFT OPERATIONS
REVIEW OF THE NATIONAL AIRSPACE SYSTEMS PLAN (NASP)

1. SUMMARY AND CONCLUSION

In reviewing the National Airspace Systems Plan (NASP), the AIAA Technical Committee on Aircraft Operations commends the Federal Aviation Administration (FAA) for a long range, imaginative and comprehensive plan - the NASP.

TC - Aircraft Operations has received a number of briefings on the NASP by FAA personnel and wishes to express appreciation for this generous support.

Although many details of the NASP and its supporting plans for implementation, operation, etc., have yet to unfold; the overall concept is unquestionably sound and it is fully endorsed by this Technical Committee.

Some of our concerns will inevitably disappear with the passage of time and as more planning is completed. However, some are recorded in this "Position Paper" simply to highlight areas which may be critical and do need consideration - they are few by comparison with the overall thought and planning which has gone into the NASP thus far.

Of particular note:

1. Systems integration aspects of the NASP will indeed be complex and will require very careful planning.

2. Budget (funding) requirements will be enormous through the next decade and a half, and a great deal of communication and visibility will be essential, at the national level, to assure continuity.

3. We recommended in a "Position Paper" in 1981, which dealt with the Air Traffic Control System and its needs for the future, the formation of an "Overview Committee" at the "National" level to review requirements for long range planning and appropriate R & D effort. We do so again, but in the context of assuring that the excellence of what has been achieved in the NASP, continues unobstructed from Administration to Administration.

The entire aviation community and the FAA, in particular, have the opportunity to upgrade the National Airspace System such that it continues as the finest in the world. The FAA has certainly seized this opportunity in a highly commendable manner.

2. INTRODUCTION

The AIAA Technical Committee on Aircraft Operations endorses the Federal Aviation Administration (FAA) proposal for the Modernization of the National Airspace System as outlined in the FAA document ("Facilities Equipment and Associated Development") National Airspace Systems Plan (NASP).

The Technical Committee commends the FAA for its leadership in establishing such a plan which has long range and broad applications to the modernization of the nation's air traffic control system for the benefit of all airspace users.

The design and development of the NASP has made significant progress since its initial announcement. Evidence of extensive, comprehensive planning for the very large-scale development and implementation effort is indeed encouraging.

The decision to award a system management contract for the procurement and implementation of the NASP is emminently sound and should ensure an orderly attainment of the demanding objectives of the NASP.

We appreciated the assistance and cooperation of the FAA staff in briefing the Technical Committee on a number of areas which had been a concern during our review. At this stage, we see only a few areas in which some comment is considered appropriate with respect to further refinement and/or improved visibility.

3. CONCERNS

3.1 Release of Supporting Documents

The Committee notes that the facilities and equipment plan concentrates heavily on what equipment the FAA must purchase to make the updated system operate, but does not address in detail the actual design of operation requirements of the system. It is the Committee's understanding that additional documents are being prepared by the FAA which will deal more substantially with these issues, including:

- operational requirements plan
- integrated airport systems plan
- research and development plan
- operation and maintenance plan
- NAS design guide

It seems to this Committee that a concise published statement of operational requirements for the updated NAS is an important factor in the acquisition of facilities and equipment. Likewise, a comprehensive plan for the research and development of technology required to satisfy the operational requirements must complement any meaningful plan for the acquisition of facilities and equipment. In the same vein, it is only through detailed systems planning for integration of the required facilities and equipment and the operational support of the facilities, that a substantial understanding of adequacy can be achieved.

For these reasons, the Committee suggests it is urgent that the FAA complete and make available to the rest of the community its plans in these areas. Without them, the true capabilities of the proposed NAS update cannot be measured.

3.2 Time-Based Operations

The Committee notes with enthusiasm the FAA's efforts to implement time-based navigation. The Committee also notes that the Facilities and Equipment Plan implies a continued evolution of the system toward levels of automation that will permit more and better time-based navigation in the future. The Committee stresses the need for designing such future systems to take maximum advantage of onboard 4-D navigation capabilities in modern aircraft and urges the FAA to implement time-based capabilities into the ground system as quickly as possible to provide incentives to operators to equip with such systems as they replace their current fleets or avionics equipment.

3.3 Data Link - Ground/Air Compatibility

There is room for improvement in the efficiency of both the operation of the individual aircraft and the efficiency of the use of the terminal area air space. While the NAS Plan implies that improvements are intended to enhance the efficiency and capacity of terminal area operations, the agency's plans for the procedural improvements and the necessary research and development in this area are expected to more clearly reveal the extent to which improvements can be expected and the schedule for their implementation. It is essential that, in addition to improving the efficiency of controller activity through better communications, etc.; the composite of plans comprising the NAS plan also address the need for greater compatibility between ground and airbourne components of the ATC process within the terminal area. To address but one example of many areas in which improvements are possible and indeed essential, the Committee suggests today's dependence on voice communication is perhaps one of the greatest constraints. Clearly, although sufficient data link technology has been available for some time, the many procedural and other system/man/machine interface issues have yet to be resolved. Also, yet to be resolved are the many benefits-versus-costs issues. Data link technology offers opportunities to dramatically improve the efficiency and reliability of communications within the NAS.

The Committee notes that although data link is referred to numerous times in the facilities and equipment plan, there are no explicit statements concerning the range of services to be provided through this medium, nor is there a schedule for implementing these services. Since this issue may more properly be considered a question of how the system will operate rather than what equipment is needed, it may be appropriate for such information to be missing from the facilities and equipment document. However, this issue is one that is of significant interest to the user community, and highlights the need for the FAA to complete its supporting plans quickly so that users may review the operatonal aspects of the future system as well as its hardware elements.

3.4 NASP - Implementation

The Committee would like to emphasize that continuing user input to updated versions of the Plan is crucial. The National Airspace Review (NAR) is a laudable example of the FAA seeking user input to the structure and operation of the existing ATC system. The FAA should assure that similar, continuing mechanisms are present to actively seek a broad cross-section of constructive user input to the structure and operation of the evolving ATC system as the NASP is implemented over the next decade; only in this manner can the users be assured of ATC service to the maximum of its potential.

3.5 Budget Criticality

The Committee notes that the Plan must always be considered as an inseparable whole or unit - a total concept, and this concept must be reflected in every phase of the necessary funding. The various elements of the NASP for F&E are mutually interdependent and omission of any particular element could be very detrimental to the overall functioning of the NAS. Congress must appreciate the importance of interrelationships in the overall Plan, and assume the responsibility to ensure the timely availability of the necessary funds for the orderly implementation of the Plan. Accordingly, the Committee feels that full and uninterrupted funding of the NASP is mandatory. As an integral part of this process, consideration must be given by both the FAA and the Congress to the proper use of the accumulated funds in the Trust Fund; certainly overall national airport capacity is an important part of the problem and its solution. The overall appropriation process will necessitate an extremely close and effective relationship between the FAA and the committees of interest in the Congress.

3.6 Technical Review

The Committee recommends that the FAA and the System Engineering and Integration (SEI) contractor prepare for presentation to the user community a periodic (annual or even semi-annual) technical review of the implementation of the Plan as it is updated, and the status of the implementation program. In this manner, the users would have current information as to the progress of the program, and could provide more effective and constructive input, as is now being carried out in the NAR mechanism. The format of such a review should provide ample time for an adequate presentation by the FAA and SEI, and for discussion during which the user community must provide meaningful commentary and feedback.

3.7 Research and Development

Whereas the Committee believes that an engineering and development program in support of the NASP is reasonably secure in the short term (approximately five years), it is concerned about the need for definition of research programs which might reasonably be expected to produce the technology base needed in the long term (i.e.; beyond the NAS plan or ten to fifteen years from now). It might be expected that certain user requirements for the future resulting from the NAR and NASP need R&D planning and budgeting now to assure that requirements judged as appropriate to the overall benefit of the National Airspace System are appropriately evaluated for future implementation.

3.8 Overview Committee

The Committee notes with approval the existence of the Administrator's Advisory Committee; it would be hoped that this group will provide valued inputs to the whole process. There is, however, another more important responsibility which the AIAA Technical Committee feels must be addressed in order to achieve the optimum development and operation of the ATC system our nation needs. We believe it will be necessary to establish a Presidential Advisory Commission on the National Airspace System to:

a) Marshall the necessary resources needed by the government agencies collectively involved in the development of the ATC system (e.g.; NASA, Department of Defense, NOAA, etc.).

b) Reflect the importance to our nation of maintaining the safest, most productive air transportation system possible.

c) Ensure meaningful inputs into the development process to the end that the system is continuously updated to meet the needs of the user community - commercial, private and military.

d) Provide the necessary continuity of funding and inter-agency momentum from Administration to Administration so essential to the sound, ongoing development and implementation of the NASP - the total concept in which so many requirements, varied interests, and factors are involved.

Such a Commission would provide the necessary oversight, better ensure the availability of needed resources, and assure the continuity so essential to the orderly progress of the implementation process. The Committee, therefore, reaffirms its recommendation on this important point as spelled out in its 1981 report. (TC - Aircraft Operations, Position Paper - The Air Traffic Control System).

4. RECOMMENDATIONS

4.1 Accelerate preparation and release of those documents which complement the [illegible]P in areas of operation, integration, R&D, maintenance, etc.

4.2 Implement time-based capabilities into the ground system as quickly as possible in order to provide incentives to operators to equip with such systems as they replace their current fleets of aircraft or avionics.

4.3 Data link, ground/air compatibility, although a concern, may simply need an understanding of the "Operational Requirements Plan". Early release of this plan is particularly important.

4.4 Assure that "User Input" continues through the NASP implementation phase to achieve a sound operational relationship between all phases of the plan.

4.5 Document and publish a complete plan of phased funding requirements and establish procedures which will assure continuity of funding for the orderly implementation of the NASP.

4.6 Present to the user community a regular (annual or semi-annual) technical update of NASP progress, including all aspects of status of supporting R&D and implementation plans.

4.7 Establish a long range (ten to fifteen years) research and development plan and budget to assure that a technological base for future improvement to the NAS are conceived, developed and thoroughly analyzed for future application and implementation.

4.8 Move in the direction of establishing an "Overview Committee" at a national level, with broad representation, in order to maximize visibility of funding and/or R&D program requirements, etc.; which may be outside the direct control of FAA, but which must be thoroughly supported if the NASP goals are to be achieved. This committee should also be provided with sufficient authority to ensure momentum of implementation through the various agencies affected.

1/1/84

BIOGRAPHICAL INFORMATION

JAMES T. PYLE

Born: November 8, 1913

Education:

Princeton University, AB Degree, Phi Beta Kappa

Additional Education:

Daniel Guggenheim School of Aeronautics, N. Y. University - Meteorology
Casey Jones School of Aeronautics - Mechanics A & E (courses)

Business Experience:

1935-46 - Pan American Airways - started in traffic department and assumed increased responsibility as experience gained, culminating in a position as Executive Assistant to Division Manager, with responsibility for all divisional operations of Pan Am's Latin American division.

1946-53 - President - 1. Air Charter Company (air taxi operations); 2. Denver Air Terminal Corp. (terminal services at Denver's Stapleton Field) - both operations liquidated and left Denver for duty in Washington.

1953-56 - Special Assistant to Assistant Secretary of Navy for Air - primary responsibility was determination of Navy's airspace requirements and the obtaining of the necessary airspace therefor. This duty resulted in extensive experience in all phases of airspace management.

1956-58 - Administrator, Civil Aeronautics Administration - responsibility for all phases of that agency's operations.

1956-61 - Deputy Administrator, Federal Aviation Agency - primarily responsible for operational programs within FAA. Assisted Administrator in all phases of agency administration.

1961-64 - Vice President, Washington, General Precision, Inc. Washington representative for defense contractor.

1964-76 - Director, Aviation Development Council - primarily responsible for supervision of community relations, public relations and technical aspects of noise abatement procedures for the airlines (U. S. and foreign flag) serving New York, and for the Port Authority of New York and New Jersey. A major part of this work involves the environmental impact of aircraft operations on the communities adjacent to the airports. ADC has also instituted an extensive program in the New York City metropolitan region in the promotion and furtherance of aviation education as a teaching aid and motivational tool; ADC has worked closely with the Boards of Education of Newark and New York City, with the State Departments of Education of New York and New Jersey, and with the Regional Office of the U. S. Department of Education to this end.

1976-Present - Director Emeritus - Aviation Development Council

Consultant and advisory services to ADC Director.

Military Service:

U. S. Naval Reserve - active duty 1944-46
Naval Air Transport Service:
- VR-11 - statistical officer
- VR-13 - operations officer; Manila detachment

Flight Experience:

Pilot - ATR rating (DC-3, CV-240/440 ratings)
14,500 hours, all types of aircraft, including jets up to and including B-52s.

Mr. GLICKMAN. Let the record reflect that the Scotty you're referring to is Scott Crossfield. Is that correct?

Mr. PYLE. Yes, sir.

Mr. GLICKMAN. OK; I just wanted to make that——

Mr. PYLE. Himself.

Mr. GLICKMAN. Himself; all right.

Thank you very much, Mr. Pyle, for your testimony, and I am aware of your background in aviation both through Scott Crossfield—discussing with him as well as independently.

So you're a person in your own right, irrespective of what Scott Crossfield says about you. [Laughter.]

Mr. PYLE. I hope you didn't believe him.

Mr. GLICKMAN. Yes.

Let me ask you this. How do you view the FAA's ability to manage a large technical project like this? This is really a Pentagon type of project, and maybe that's not very good foundation for the FAA to deal with it. [Laughter.]

But I wonder if you might have some thoughts on that.

Mr. PYLE. Yes, sir; very definitely.

I think the move which, I sort of understand perhaps was thought of first in the committee, to have a contractor command the SEI is absolutely essential, and it is excellent, and I was very much impressed with Mr. Hudoff's testimony in that regard.

Quite frankly, the agencies never had anything this big to handle. The biggest thing we ever handled prior to that was, I guess, the computer procurement, and we got in quite a bit of trouble on just that relatively simple format.

So I think it is absolutely essential, and I hope it proves to be just that—makes it a real viable, going, efficient operation.

Mr. GLICKMAN. OK; well, we appreciate your being here very much, and your entire testimony will appear in the record, including the attachments that are in back of your testimony.

Thank you very much.

Mr. PYLE. Thank you, sir.

Mr. GLICKMAN. Our next group of witnesses are a panel of folks—a users panel, basically. Why don't they all come up?

Capt. Jack Howell, with the Air Line Pilots Association; John Sheehan, with the Aircraft Owners and Pilots Association; Robert Cooke, with the NBAA.

I think perhaps there are folks with you as well.

Why don't we go ahead and, basically, ask the panel to proceed in accordance with how they're listed—Mr. Howell—Captain Howell, Mr. Sheehan, and Mr. Cooke—and so, Captain Howell, why don't you begin?

I'll say again to the witnesses, your entire statements will appear in the record, and we're going to ring you at 10 minutes. So if you want to try to summarize it, we'd sure appreciate it. Go ahead.

STATEMENTS OF JACK D. HOWELL, CHAIRMAN, AIR TRAFFIC CONTROL COMMITTEE, AIR LINE PILOTS ASSOCIATION, WASHINGTON, DC, ACCOMPANIED BY WARD BAKER, SENIOR STAFF ENGINEER; JOHN SHEEHAN, SENIOR VICE PRESIDENT, GOVERNMENT AND PUBLIC AFFAIRS, AIRCRAFT OWNERS AND PILOTS ASSOCIATION, FREDERICK, MD; ROBERT A. COOKE, VICE PRESIDENT, OPERATIONS, NATIONAL BUSINESS AIRCRAFT ASSOCIATION, INC., WASHINGTON, DC, ACCOMPANIED BY C. DENNIS WRIGHT, MANAGER, AIRSPACE/AIR TRAFFIC CONTROL SERVICES

Mr. HOWELL. Thank you, Mr. Chairman.

I'm Jack Howell, chairman of the Air Traffic Control Committee for the Air Line Pilots Association.

With me today is Ward Baker, who is our senior staff engineer for the committee.

ALPA, through membership input, recognizes the need to modernize the airspace system, and we continue to review certain aspects of the FAA's new National Airspace System Plan to determine how it will impact our use of the airspace.

In general, we find the plan as proposed by the FAA to be a highly commendable effort which consolidates into a single document descriptions of the equipment requirements, implementation goals, and R&D efforts necessary for airspace modernization.

We do, however, continue to have some overall reservations about its usefulness as well as some specific recommendations regarding individual elements in the plan.

Our testimony covers eight of these reservations and recommendations, and I shall summarize the key points of these briefly.

First, lack of detail.

The system descriptions in the plan are all very qualitative, and, because of this, ALPA cannot fully assess some technical operational aspects of the plan.

We hope that in the absence of this technical detail, the FAA management scheme, as we learned about it today, will allow, if not solicit, input from the many airspace user groups throughout the development cycles of the various subsystems.

Second, airport capacity.

The FAA airspace system modernization program must include a vigorous effort directed at the airport capacity problem.

In this regard, ALPA supports the continuation of the research and development work which is associated with the recommendations of the Airport Capacity and Delay Reduction Task Force which, incidentally, is meeting again tomorrow. The plan should contain positive commitments toward resolving the airport capacity problems.

No. 3, the Microwave Landing System or MLS.

The MLS has the advantage of offering very precise guidance, and it can also provide for curved paths to a runway which will allow for distribution of noise and wake turbulence, but this technology is not providing any congestion relief at this time because of the cost of implementing these systems.

Fourth, automated enroute air traffic control, sometimes called AERA.

The description of the AERA contained in the plan is so general that implications of a terribly inefficient system can be drawn by a reader, especially if he interprets the heavy emphasis on ground-based management as an indication of the removal of operational control from the airspace users.

ALPA believes the primary function of AERA should be to permit maximum operational flexibility through resolving real-time short-term conflicts as they arise, and, secondarily, to recognize potential long-term conflicts and so advise the operator.

ALPA also believes the issue of safety in automated ATC has not been sufficiently addressed by the plan. The fail-soft feature of distributed processing in the sector suites will apparently not permit the continued functioning of AERA in the event of a central computer outage.

No human controller can quickly and adequately take over an entire saturated sector in the event of an AERA failure. Therefore, a fully functioning TCAS—collision avoidance system—must be in place under the AERA concept, and CDTI, as Mr. Pyle just explained it, should also be implemented so that each pilot can at least watch out for his own single aircraft in relation to those around him.

A bit more about the collision avoidance system. Today, that program has stopped dead in its tracks. The phase II tests at Piedmont Airlines and the Limited Implementation Program are in jeopardy because FAA certification personnel are concerned about the minimum TCAS II system software.

ALPA has also had concerns about this system, and we therefore understand some of the FAA's hesitancy to certify this system.

Nevertheless, we urge the FAA to continue with the phase II tests at Piedmont. But, even more importantly, we urge the FAA to expedite the TCAS III development program for air carrier aircraft.

This latter system has better surveillance accuracy through its eight-element antenna; it provides both horizontal and vertical resolution advisories; and, because it has much improved software over that of the minimum TCAS II, it has a lower false alarm rate.

TCAS III has already been flown in FAA's test aircraft and, so far, has passed with flying colors.

The sixth item I'd like to talk about is the Cockpit Display of Traffic Information, or CDTI. While the original NAS plan at least briefly addressed the possible merits of CDTI, the current version does not contain any reference to such a system at all.

The tests of CDTI to date by the FAA and NASA have shown to everyone's satisfaction that substantial capacity gains may be achieved through pilot-controlled spacing on in-trail arrivals and departures using common paths. Therefore, we recommend that CDTI be reinstated as an active program in the NAS plan.

In the past, two factors have delayed implementation of the CDTI concept: one, the availablility of a data source; and, two, the availability of an adequate cockpit display.

Now, however, the decision to implement TCAS and the availability of either an electronic HSI or a digitized weather radar CRT provide both the source of traffic information needed and the instrument panel location for its display.

We've heard a lot about the FSS modernization and consolidation, even some today which has caused me to decide to go ahead and eliminate my remarks at this point, because we will be continuing to monitor the developments in this area.

I'd like to conclude with an overview of our considerations with respect to weather.

I'm sure you're aware, Mr. Chairman, that severe weather is the archenemy of pilots. We still have concerns about the inability to obtain accurate information on this phenomenon in close proximity to airports.

Timely information on microbursts, gust fronts, wind shear, and heavy precipitation is needed by all pilots but, unfortunately, is not readily available today.

The national airspace system plan and its companion document, the "Aviation Weather System Plan," contain encouraging programs which, if implemented, should provide a significant measure of relief, but where are these programs?

The House Subcommittee on Investigations and Oversight recently released its report "The Impact of Weather on Aviation Safety." This report succinctly identified the worrisome delays in the implementation caused by the never-ending R&D process, and it now appears that an even more ominous hurdle may delay progress—possible funding limitations.

Because of the number of aviation accidents that are weather related, it is obvious that systems such as the next generation radar—the NEXRAD system—terminal Doppler radar, and automated weather observing systems should receive some priority treatment in the scheme of updating the national airspace system.

We urge you and the newly formed House aviation forum and, indeed, all of Congress to focus your attention on this matter and to establish priorities so that if funding does become a factor in system modernization, safety-related programs such as weather and an effective collision-avoidance system should be addressed first, and programs dealing with increased capacity and economy of operations second.

This concludes my remarks, Mr. Chairman, and I'll be happy to answer any questions that might arise.

[The prepared statement of Mr. Howell follows:]

PREPARED STATEMENT OF JACK D. HOWELL.

Mr. Chairman and members of the panel, I am Jack Howell, Chairman, Air Traffic Control Committee of the Air Line Pilots Association. ALPA represents the professional interests of 34,000 pilots who fly for 45 airlines. With me today is Ward Baker, who is the Senior Staff Engineer for our ATC Committee.

The line pilots we represent have been delegated by a Federal Aviation Regulation with the statutory responsibility for the safety of the millions of passengerswho utilize our National Airspace System (NAS). Because of this legal responsibility and the unique position we hold, we believe we are able to provide special and unique insights into the realities of daily airline operations.

ALPA, through membership input, recognizes the need to modernize the airspace system, and we continue to review certain aspects of the FAA's new National Airspace System Plan to determine how it will impact our use of the airspace. In general, we find the Plan as proposed by the FAA to be a highly commendable effort which consolidates into a single document descriptions of the equipment requirements, implementation goals, and R&D efforts necessary for airspace modernization. We do, however, continue to have some overall reservations about its usefulness as well as some specific suggestions regarding some individual elements in the plan.

1. Lack of Detail. The system descriptions in the Plan are all very qualitative, and because of this ALPA cannot fully assess some technical and operational aspects of the Plan. We hope that in the absence of this technical detail, the FAA management scheme will allow -- if not solicit -- input from the many airspace user groups throughout the development cycles of the various sub-systems.

2. Airport Capacity. One of the weakest points in the Plan is the lack of consideration for airport capacity. FAA forecasts of aviation activity and the resultant demand on airports, even if only roughly accurate, indicate that the current airport/airway system cannot accommodate expected growth without delays of "30 minutes per operation" during peak hours at the nation's major airports. The FAA airspace system modernization program must include a vigorous effort directed at the airport capacity problem. In this regard, ALPA supports the continuation of the research and development work which is associated with the Recommendations of the Airport Capacity and Delay Reduction Task Force. The Plan should contain positive commitments toward resolving the airport capacity problems.

3. MLS. The Microwave Landing System (MLS) has the advantage of offering very precise guidance, and in some instances where terrain dificulties are encountered, it can provide guidance where standard Instrument Landing Systems (ILS) will not work. The MLS can also provide for curved paths to a runway which will allow for distribution of noise and wake turbulence. But again this technology is not providing any congestion relief at this time because of the cost of implementing these systems.

4. Automated En Route Air Traffic Control. While ALPA strongly supports the planned computer replacement program currently underway, it appears the design of the AERA software program described in the NASP will determine, more than anything else, the efficiency and capacity of the future ATC System. If this is done corrrectly, the future looks very bright.

However, since the description of AERA contained in the Plan is so general, implications of a terribly inefficient system can be drawn by a reader. especially if he interprets the heavy emphasis on ground-based management as an indication of the removal of operational control from the airspace users.

The primary function of AERA should be to permit maximum operational flexibility through resolving real-time conflicts en route as this function becomes necessary, and the secondary function should be to recognize potential long-term conflict and so advise the operator. These functions can be accomplished safely through proper inclusions of a Cockpit Display of Traffic Information (CDTI) and a Traffic Alert and Collision Avoidance System (TCAS).

The issue of safety in automated ATC has not been sufficiently addressed by the Plan. The fail-soft feature of distributed processing in the sector suites will apparently not permit the continued functioning of AERA in the event of a central computer outage. No human controller can quickly and adequately take over an entire saturated sector in the event of an AERA failure. Therefore, a fully functioning TCAS system must be in place under the AERA concept, and CDTI must also be implemented so that each pilot can at least watch out for his own single aircraft in relation to those around him.

5. TCAS. One of the basic assumptions of the Plan is that no change to the ATC System will be permitted to reduce safety or to increase risk. To maintain the existing level of safety and to reduce risk, the FAA claims that a very high level of mid-air collision protection, including the independent airborne separation device called TCAS, will be available.

However, today the TCAS program has stopped dead in its tracks. The Phase II tests at Piedmont Airlines and the Limited Implementation Program (LIP) are in jeopardy because FAA certification personnel are concerned about the system software or how the TCAS computer does its job. The TCAS being tested is called Minimum TCAS II. It is a system that will give only vertical commands for resolution advisories and one that has a rather high false alarm rate. ALPA has had concerns about this system with these inherent limitations, and we therefore understand some of the FAA's hesitancy to certify this system. Nevertheless, we urge the FAA to continue with the Phase II tests at Piedmont. Even more importantly, however, we urge the FAA to expedite the TCAS III development program for air carrier aircraft. This system has better surveillance accuracy through its 8 element antennae; it provides both horizontal and vertical resolution advisories; and because it has much improved software over that of the Minimum TCAS II, it has a lower false alarm rate. TCAS III has already been flown in FAA's test aircraft and so far has passed with flying colors.

A capable TCAS system becomes even more important when you consider automation and consolidation, the backbone of the NASP. These two features alone highlight the need for an independent backup system capable of maintaining an adequate level of safety following the failure of any power supply, hardware, or software systems on the ground.

6. CDTI. The Air Line Pilots Association is concerned that the potential role of the Cockpit Display of Traffic Information in the new ATC system has been clouded both by exaggerated claims by some of its proponents and by those whose interest in competing alternatives prevents a positive approach toward developing the concept into a working reality. While the original NASP at least briefly addressed the possible merits of CDTI, the current version does not contain any reference to such a system at all. The tests of the CDTI to date by the FAA and NASA have shown to everyone's satisfaction that substantial capacity gains may be achieved through pilot-controlled spacing on in-trail arrivals and departures using common paths. We recommend that CDTI be reinstated as an active program in the NAS Plan.

   In the past, two factors have delayed implementation of the CDTI concept the availiability of a data source to drive the display and the availability of an adequate cockpit display. The data source could be the ground-based ATC system utilizing a data link as a communication channel. However, the decision to implement TCAS II on most of the aircraft which use the capacity-restricted airports, and the availability of either an electronic HSI or at least a digitized weather radar CRT on those same aircraft, provide both the source of traffic information needed by CDTI and the instrument panel location for its display. While it may be an over-simplification of how CDTI could be implemented, all that would be necessary would be to add a paragraph to the controllers' handbook permitting the issuance of an IFR clearance to a CDTI-equipped aircraft which would permit this aircraft to follow an identified aircraft at a specified distance.

7. FSS Modernization. When the original Flight Service Station (FSS) consolidation plan was announced by the FAA, they stated every location would receive "equal or better service." Based on this commitment, the aviation community generally supported the FAA program. However, that service commitment has since been abandoned by the FAA, while the plan for many closures is still in effect. The Air Line Pilots Association does not support this program.

   Many of our members who operate under both Part 121 and 135 of the Federal Aviation Regulations frequent airports without operating control towers. At many of these locations they depend on the FSS facility to provide them professional services relating to airport traffic advisories, runway conditions, bird activity, and other various types of information needed by a pilot. When an FSS at one of these locations is closed, the aviation public no longer has the benefit of this service, and the attendant adverse impact on safety results. The FAA has stated that such information can be provided by a "hub" FSS via remote transmitters. While this may be technically possible, we seriously doubt that a few FSS specialists located in a consolidated "hub" facility miles away from the many airports it is serving can issue the same quality and quantity of advisory information that a much larger number of specialists were providing when they worked in FSS facilities located at these airports.

8. Weather: I'm sure you are aware, Mr. Chairman, that severe weather is the arch enemy of pilots. We still have concerns about the inability to obtain accurate information on this phenomenon in close proximity to airports. Timely information on microbursts, gust fronts, wind shear, and heavy precipitation is needed by all pilots, but unfortunately is not readily available today. The National Airspace System Plan and its companion document, the Aviation Weather System Plan, contain encouraging programs which if implemented should provide a significant measure of relief. But where are these programs? The House Subcommittee on Investigations and Oversight recently released its report, "The Impact of Weather on Aviation Safety." This report succinctly identified the wearisome delays in their implementation caused by the never-ending R&D process. It now appears that an even more ominous hurdle may delay progress: possible funding limitations. Because of the number of aviation accidents that are weather related, it is obvious that systems such as the Next Generation Radar (NEXRAD) Terminal Doppler Radar and Automated Weather Observing Systems (AWOS) should receive some priority treatment in the scheme of upgrading the National Airspace System. We urge you to focus your attention on this matter and establish priorities so that if funding does become a factor in system modernization, safety-related programs such as weather and an effective collision avoidance system would be addressed first, and programs dealing with increased capacity and economy of operations secondly.

This concludes my remarks, Mr. Chairman. I am prepared to answer any questions you may have.

Mr. GLICKMAN. Thank you. Why don't we go to Mr. Sheehan now?

Mr. SHEEHAN. Thank you, Mr. Chairman.

We appreciate the opportunity to come and speak here, and I bring the regrets of Mr. Baker to you, not being able to speak here. As you know, he's undoubtedly one of our more eloquent testifiers, and I'll try to do my best, however.

AOPA has been one of the most notable critics of the national airspace plan over the years, and we continue to have great concerns about the direction that the NASP plan is going in, and I'd like to share some of those concerns with you.

I guess one of the basic ones is the fact that the activity forecast that the FAA has published yearly over the past 7 or 8 years has, in large part, driven what the end product of the NASP plan is supposed to be, and I think it's clear to see that those forecasts have missed the mark.

We have several charts appended to the back of our testimony that will give evidence to the fact that over about an 8-year period that there have been some very large misses in their forecast accuracy.

Our thought is, if they can't be accurate concerning the forecasts they're going to have, how can they design a system that will meet something that will never be?

A little bit more about philosophy. In May 1983, the then-administrator, J. Lynn Helms, challenged the aviation community to make an objective, dispassionate, and systematic assessment of the value of space technology applications of civil aviation.

He admitted that the NASP failed to include a transition to satellite navigation. Indeed, existing satellite communications, navigation, or surveillance technology are not part—a part of the 1984 NASP.

Helms' comments closely following implementation of the first brown book are particularly relevant to this hearing. I want to make several important points derived from those remarks.

The NASP essentially froze technology in 1981. The FAA's fully funded budget concept and resistance to change in NASP programs perpetuate continued expenditure of public funds for R&D and F&E in order to support programs made obsolete by advancing technologies.

Administrator Helms sold the NASP as a package deal. Congress and users were led to believe that elements of the plan were inextricably interwoven with other—other parts and that elimination of any program would unravel the fabric holding the plan together.

We know today that he was at least partially right. Slippages, budget cuts, and failures of 1981 technologies to meet system requirements have indeed begun to unravel the plan.

One of our big objections has been that the users, we feel—and we can only speak as AOPA—the users were never asked for a set of requirements, as we saw them, for the century to come.

Finally, the FAA, at the insistence of the users, commissioned the RTCA—that is, the Radio Technical Commission for Aeronautics—to form a special committee to "create an appropriate statement of needs, requirements, and conditions, for the application of space technology to civil aviation."

SC155, the program that is actively engaged in this process, has met for a little bit over a year now and should finish up its deliberations this year.

It is through this means we hope to put what we see as the true requirements for the national airspace system plan to come into effect through the FAA.

Let's talk a little bit about satellite technology, and I guess it's our desire to see the national airspace system plan to give us the best possible and the safest possible system in the years to come at the least expenditure of money and as simple as possible.

We can't see how this complicated system, listed in the NASP, is going to be able to do that, and it's difficult to understand the FAA's reluctance to embrace satellite technology as a potential ATC communication, navigation, and surveillance—or CNS—solution.

FAA has essentially ignored the initial work of this committee I just talked about—SC155—and now is quoting the global positioning system—that is, the satellite system initially developed by the military for military navigation purposes.

They are promoting this system for the future air navigations systems conference, and we have no real difficulty with—with the GPS; it's just that we see satellite technology as being able to do a lot more for us than just positioning.

Again, they leave out the other two legs of the three-legged stool, which is communications and surveillance.

OK, let's talk a little bit about some of the specific NASP programs that we've heard about. You're probably also aware that AOPA is not convinced that the microwave landing system is going to give us everything we need for the years to come.

It hasn't been shown to us that there is a true advantage to us, the owners of 130,000 ILS airborne systems today to convert to a system that promises to be expensive and to be a single element system, having no other features other than guiding the aircraft for the final few minutes of a very few flights that are in bad weather.

We also find that on the international arena, the MLS is not catching much favor. An interesting quote from the chief of the Department of Radio Navigation and Communications in France in February of this year, in his submission to the International Civil Aviation Organization, on the air navigation system, stated quite simply that, "Not a single operator of aircraft in Europe is calling for MLS," and it's my concept that very few people are vocally calling for MLS in the United States either.

Let's talk a little bit about the mode-S transponder. Mode-S transponder is supposed to replace the current beacon system used by virtually all aircraft in the instrument flight system.

The mode-S is one of the cornerstones of the TCAS system and promises to give better definition of aircraft target and a long-awaited data system to provide weather information and other needed data to the cockpit.

Here, again, we don't see where this is going to serve our members adequately, because this is a system designed principally for the mid- and high-altitude systems, offering very little advantage to us in the low-altitude system.

Finally, a few words about the advanced automation system that we've heard so much about. We feel that this is a terribly complex system. It's going to be very difficult to deliver on time with the stated benefits.

We feel that there should be a new look taken at the advanced automation system with the light of potentially stopping the system after we install the Host computer—that is, the interim computers for the system—to take another look at the system in terms of new technology and go from there.

It's our estimate—it's our guestimate, I might say, that the Host system will provide sufficient capacity and hardware for the next 10 to 15 years after the Host is installed, and that will give us a slight respite, where we can take a better look at the system and see what we truly need for the 21st century.

Flight service station issues—we're probably the FAA's greatest critic on flight service station issues, because we see the automation of the flight service station as being critical to flying safety and service to the pilot before the old stations are closed.

The system has slipped anywhere between 1 and 4 years, depending upon how you want to look at it, and, because of that, we are very skeptical as to the final outcome of the flight service station.

The eventual design for the flight service station—that is, the model 2 software—is—has been essentially halted, and we'd like to see an entire new thrust taken to the flight service station system.

I see I've run out of time. I'd be glad to answer any questions you have.

[The prepared statement of Mr. Sheehan follows:]

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STATEMENT OF JOHN L. BAKER, PRESIDENT
AIRCRAFT OWNERS AND PILOTS ASSOCIATION
NATIONAL AIRSPACE SYSTEM PLAN R&D PROGRAMS
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS
HONORABLE DAN GLICKMAN, CHAIRMAN
TUESDAY, MARCH 19, 1985

I am John L. Baker, President of the Aircraft Owners and Pilots Association (AOPA). I am pleased to have this opportunity to present these comments relative to the National Airspace System Plan (NASP).

The Aircraft Owners and Pilots Association (AOPA) represents the aviation interests of more than 265,000 individuals who own and fly general aviation aircraft for business and personal transportation. AOPA's members have a deep interest in the Federal Aviation Administration's National Airspace System Plan. They represent a large cross section of both the beneficiaries and victims of its programs and are contributors of tax revenue to meet its costs.

AOPA has consistently argued that the National Airspace System Plan (NASP) has significant deficiencies. We expressed concern when the first Brown Book was presented by Administrator Helms in 1981, because it had been developed without input from the user. More significant perhaps, we later cautioned Congress that the "Plan" was in fact a "collection" of often times previously proposed, rejected and unrelated programs held up as a system. We suggested that you should not hand FAA a "blank check" until NASP uncertainties were resolved.

Today I can demonstrate the validity of our previous comments. Forecasts upon which the NASP depends were wrong. NASP theory is wrong. FAA statements of cost/benefit accruing to NASP are wrong. The claim that NASP would increase capacity is wrong. NASP target dates are wrong and NASP technology, for the most part, is wrong.

NASP FORECAST

It seems only logical to assume that planners of the future National Airspace System would carefully forecast the size and composition of the aviation community. Statistics reveal how far their estimates have missed the mark.

For example, a graphic analysis of aircraft operations forecasts provided by the FAA each year shows little responsiveness to reality except in changing the curve origin on charts of their estimates. Note, however, that each curve ultimately reaches the target operations forecast necessary to justify portions of the NASP. (Attached illustrations.)

What concerns us more is the suggestion that FAA's forecasting intentionally keeps future estimates of traffic count and aircraft density at numbers which justify NASP programs. This is merely a way of selling NASP programs to the public and to congress.

Our concern is obviously not directed at overly optimistic forecasting. Rather we suggest that the NASP is immediately suspect because it is predicated on these forecasts.

PHILOSOPHY

In May 1983, then FAA Administrator J. Lynn Helms challenged the aviation community to "make an objective, dispassionate, and systematic assessment of the value of space technology applications to civil aviation." He admitted that the NASP failed to "include a transition to satellite navigation." Indeed existing satellite communications, navigation or surveillance technology are not part of the 1984 NASP.

Helms comments, so closely following implementation of the first Brown Book, are particularly relevant to this hearing. I want to make several important points derived from those remarks.

The NASP essentially froze technology at the 1981 level (if we assume that all NASP programs are predicated on 1981 state-of-the-art solutions, and there is considerable doubt about the validity of that assumption). The FAA's fully funded budget concept and steadfast resistance to any change in NASP programs perpetuate continued expenditure of public funds for R&D and F&E, in order to support programs made obsolete by advancing technologies.

Administrator Helms "sold" the NASP as a package deal. Congress and users were led to believe that elements of the plan were inextricably interwoven with each other and that elimination of any program would unravel the fabric holding the plan together.

We know today that he was at least partially right. Slippages, budget cuts and failure of 1981 technologies to meet system requirements have indeed begun to unravel the plan.

Alluding to the failed Multi-national Aeronautical (AEROSAT) project, Helms said, "We... the civil aviation community... have failed to examine aviation problems, needs, and technical solutions ... in a well-considered, systematic manner. Specific applications ... will succeed only if and because the requirements are clear, and the solutions finite and quantifiable. If we can come to grips with a series of difficult questions which only the user community can answer, we could judge new proposals --- on the basis of valid, agreed to requirements."

I think that Administrator Helms' statement outlines the way that FAA should have gone about creating NASP. The Plan clearly must spring from user requirements.

But there is no statement of user requirement to support the NASP! This is because there was no user input.

SC155/ICAO FANS

"FAA at the insistence of user groups, finally realized the shortcoming of NASP. They belatedly asked the Radio Technical Commission for Aeronautics (RTCA) to form a special committee to "create an appropriate statement of needs, requirements and conditions for the application of space technology to civil aviation."

RTCA established Special Committee 155, User Requirements for Future Communications, Navigation and Surveillance Systems, including Space Technology Applications, in response to the FAA's request. It was made obvious that SC 155 output would be key to developing the US position at the International Civil Aviation Organization (ICAO) Future Air Navigation Systems (FANS) panel.

The Operations Working Group, one of three working groups subordinate to SC 155, met 9 times in 11 months and produced, in December 1984, an interim report which includes a detailed assessment of users' needs. Since the work program at SC 155 is an iterative process, further refining of these statements of need will occur during 1985, but the important point is that the aviation community perception of future airspace system needs has been expressed.

NAS OPERATIONAL REQUIREMENTS DOCUMENT

In October 1984, FAA released a draft document titled National Airspace System Operational Requirements. Users were chagrined that during the year of its preparation no user input was solicited and it appeared that ongoing work at RTCA SC 155 had been ignored. The requirements document clearly was prepared against the backdrop of programs and technologies of the NASP. For the most part "requirements" are expressed in terms of the required operating capabilities of specific hardware identified by the FAA in the NASP to meet internal objectives. The precision approach requirement statement is a glaring example - it is a mirror image of the MLS system capability it was written to justify.

The FAA later agreed that the document was not a requirement statement per se, that it was retrospective and not a statement of user airspace system requirements. I understand that in its fourth iteration, the document has been retitled "NAS System Requirements Specifications" to better describe its use as a "yardstick" for Systems Engineering and Integration (SEI) contractor performance.

The tragic reality is that the NASP continues to founder, predicated on 1981 technology decisions and without an assessment of user airspace system needs for the period in which the plan will be implemented. This, despite revolutionary advances in technology since 1981 and the statements of requirement available to FAA from the RTCA SC 155 which they chartered.

SATELLITE TECHNOLOGY

More difficult to understand is FAA's reluctance to embrace satellite technology as a potential ATC Communication, Navigation and Surveillance (CNS) solution.

It is our understanding that shortly after his appointment, Deputy Administrator Jones was briefed on FAA Satellite Activities and Plans. You may be as dismayed as I that the briefing suggests that there was no FAA involvement in satellite activity between 1978 and 1984. Total activity in 1984 was participation in RTCA SC155 and ICAO FANS. For nearly seven years FAA has shunned ATC satellites.

I've tried to illustrate that FAA has essentially ignored SC155 output, and is dedicated to "selling" Global Positioning System (GPS) at Future Air Navigation Systems Conference (FANS) (and seeking FANS support for implementation of Aeronautical Review Committee recommendations). FAA is engaged in a circular action to avoid discussion of a multipurpose CNS satellite system. The NASP continues to be "a plethora of solutions searching for problems."

I recognize that this subcommittee's primary interest in NASP is related more to research and development issues than those I've described so far. However, your oversight authority can be a valuable influence in determining the future of NASP programs. For that reason, and because we are approaching a critical junction where NASP slippages and the end of the five year budget authorization meet, the discussion of those issues was appropriate.

NASP PROGRAMS

AOPA's support for airways modernizations is unwaivering and our position on NASP is also well known. However, I'd like to briefly consider several NASP programs and our previous comments on them.

Microwave Landing System (MLS) - Technology has literally passed MLS by. What may have been an acceptable precision approach technology in the early 1970's when tube type ILS was the alternative, today approaches obsolescence. Start-up delays continue to prevent delivery of MLS transmitters. Budget cuts are forcing delays in the second and third purchases and there will be fewer transmitters in those buys. Few MLS avionics are available and they are still exceedingly expensive.

Ultimately, FAA's plan calls for reequipping 132,000 ILS capable aircraft with MLS avionics. That change buys nothing for the general aviation user but adds billions in equipment costs and delays precision approaches at hundreds of airports for as much as 10 years.

International aviation community attitude toward MLS was best expressed by Mr. Olivier Carel, Chief, Department of Radio Navigation and Communications of France in a February 1985, submission to ICAO FANS.

"Not a single operator of aircraft in Europe is calling for MLS." Very few in the U.S. are either.

FAA and the aviation community agree that the National Airspace System most often suffers from saturation due to airport capacity limitations and/or weather. The NASP itself acknowledges that "capacity limitations at busy airports will be the constraining element." Senior FAA officals grudgingly admit that the only NASP program which has potential to "increase airport capacity," may be MLS (at best a dubious claim, since runway acceptance rate is the limiting factor and MLS cannot improve this). Most users agree that airport capacity can only be increased by adding more runways and the NASP doesn't address such solutions to airport capacity problems.

In any case, continued delays in the MLS program stretch out the time that precision approach capability currently available from ILS is denied to numerous communities. The opportunity cost is enormous, belying touted benefits.

Mode S - Mode S is intended to address the problem of interference between existing Air Traffic Control Radar Beacon (ATCRBS) transponders which garbles the information received by air traffic control. The problem is always transparent to the pilot and only exists temporarily at a few high density terminal areas. The problem can be corrected without having to resort to Mode S.

Mode S does not contribute to lowering the floor of radar coverage. In fact, the number of sensors envisioned and line of sight limitations will actually raise the average lower limit from approximately 5000 feet to 6000 feet.

Mode S intends to provide a data link for transmission of weather advisory and ATC messages. AOPA feels that such a capability is useful, but Mode S has significant built in data flow capacity problems when compared to existing data link concepts not contingent on the ATC radar sweep.

The benefits of Mode S are not clear enough to imagine voluntary equippage in large numbers. The General Accounting Office report of May 4, 1984, "Interim Observations on FAA's Plans for Major Systems Acquisition," and both Office of Technology Assessment (OTA) reports previously cited, point to satellite-based communications/navigation/and surveillance systems which "may offer significantly better coverage, accuracy, and capacity than Mode S and at a lower total cost to FAA and users. As currently planned, it appears that full Mode S coverage (only to 6000 feet) may not be ...available until the early 1990's (FAA says 1994). Meanwhile, several promising alternatives (space-based)...could be available in the late 1980s to early 1990's."

It appears that FAA will have to resort to regulations forcing Mode S carriage to meet their projected 71% equipage of Mode S by 1995 and 97% by 2000. Again at a high cost for users but with limited off setting benefits.

The attraction of multipurpose satellites and lack of Mode S services below 12,500 feet until 1995 or later will discourage purchase by most general aviation operators. To expect 36% of that fleet to voluntarily equip to obtain service when only 10% of them operate above 12,500 feet is ludicrous. Equally ridiculous, is the assertion that "95% of all new aircraft entering the fleet subsequent to 1986 will be Mode S equipped."

AOPA doubts that such levels of equipage can be reached voluntarily and will resolutely fight such a mandate. I seriously doubt any cost-benefit analysis predicated on such a presumption.

Dr. Neal Blake expressed FAA attitude toward "voluntary" equippage this way;

> "If one expects people to voluntarily equip with something, there has to be a benefit; there have to be services. If you want to get the good ATC service, you will have to buy it." This is typical FAA "through the looking glass" logic!

I question whether the service offered by Mode S will attract sufficient users to justify the implementation.

An en route oriented Mode S cannot satisfy general aviation's on-the-surface-requirements for the Flight Service Station kinds of service. Such service is precluded by the prohibitive number of sensors and related links to FAA data sources which would be required.

I doubt that the 90 proposed en route Mode S ground sensors can accomplish service even to 6,000 feet when it takes about 200 Air Traffic Control Radar Beacon (ATCRBS) sensors to provide that coverage today. The NASP proposes coverage, down to 6,000 feet, by the year 2000 with Mode S.

The Mode S data link is an integral part of Threat Alert Collision Avoidance System (TCAS) proposals as well. TCAS conceptually depends on a high rate of equippage, but unresolved problems of interference between participating aircraft increase with equipage rates.

AOPA is concerned that TCAS will remain a "gold plated" system, very costly to the user. Despite inconclusive evidence that it will reduce midair collision potential, TCAS will precipitate early mandates for Mode S carriage. FAA's press for this is simply not justified. Further, AOPA is not enamored of the Mode S transition proposal.

We believe the Air Traffic Control Radar Beacon transponder should be permitted to continue as the primary remitter until it can be shown conclusively to cause problematic interference, and then local remedies should be considered.

Advanced Automation System (AAS) - Host Computer. The FAA's planned "compute-off" between IBM and Sperry for the Host Computer is of questionable value. It is based on a traffic and ATC configuration scenario using statistics from 1972. More interesting is the fact that each contractor will receive between 40-45 million dollars for this competitive test, which will select equipment costing 200 million.

Although MITRE has been tasked to create a more realistic test scenario, it will be six months before a realistic evaluation can get underway. Obviously, selection of a Host contract recipient should be delayed, and equipment acquisition safely slipped a year or until test results are available and evaluated. Last year we challenged FAA to defend the Host concept at this year's appropriation hearings. This year we may be able to help them.

We feel that since Host can do both the Electronic Tabular Display System (ETABS) (flight data display) and en route metering functions of AAS and Automated Enroute ATC (AERA), the immediate operational need for these advanced concepts is doubtful. However, all too soon, the Host Computer will be replaced by a distributive processing system with dedicated computers for each function.

The Host Computer is at least a viable alternative to a "too fast" slide into Advanced Automation System (AAS). It may allow FAA to improve reliability, maintainability and capacity in automation hardware by providing 10-15 years in which to validate new ADP functions, system configurations, and to design a system architecture, before rushing into AAS and AERA.

AERA I, in any case, ultimately leaves automated conflict resolution to the discretion of the controller. For all practical purposes, AERA II is not invented yet and that development depends on a significant break-through in artificial intelligence. Yet FAA NASP Cost/Benefit analysis are predicated on the full implementation of its successor, AERA III, still in the concept stage.

In all, AAS will cost more than 3.1 billion dollars to develop and acquire. Much of its hardware will be replaced during transition and it is a system designed to meet nonvalidated requirements.

Sector Suites - Last year, we recommended that FAA delay development of sector suite at least until the actual advanced automation program was defined. By building in advance, the FAA has limited its future alternatives and is determining the course of Advanced Automation System. In any case, sector suite depends on NEXRAD and color weather processor capability which FAA has not yet selected.

I believe that more than 100 million dollars could be saved by halting sector suite development until other elements of the system are clearly defined. FAA anticipates spending 50,000 to 100,000 dollars each for up to 2000 of these devices. The money could be put to better use today by building runways.

Area Control Facility - AOPA continues to oppose the Area Control Facility (ACF) concept, but today I challenge its validity on the basis of FAA's cost/benefit analysis.

FLIGHT SERVICE STATION (FSS) ISSUES

Automated Weather Observation System (AWOS) - The Office of Management and Budget (OMB) has reduced FAA plans for 745 AWOS units (tower/ex-FSS and unmanned sites) to 132 (unmanned locations) by forcing FY 86 budget cuts. AOPA is sympathetic to the plan to place these units at unmanned locations, but the reduction in number of units creates a huge void in weather observing capability.
We prefer human observers. If all Airport Improvement Program (AIP) specified units (400) were implemented, and human contract observers were placed at 347 tower/ex-FSS locations, some 900 airports with instrument approaches could still lack long-awaited weather observation capability.

AOPA is aware of commercial alternatives to AWOS that for $12,000 will do all of the $150,000 AWOS functions except report ceiling and visibility. AWOS is gold plated, but there are now too few of them in FAA budget proposal. I feel that its potential service is crucial to aviation safety, but where we can't have AWOS these alternatives represent a 'better than nothing' solution.

The highly publicized improvement in severe weather (radar) information for controllers and FSS specialists is completely dependent on the very expensive, exotic NEXRAD radar; on the Central Weather Processor in each Area Control Facility, 2 Aviation Weather Processors, National Airspace Data Interchange (NADIN) high speed data network, Mode S transponder, FSS automation, and sector suite development of AAS. AOPA has learned that NEXRAD development has now essentially been halted. FAA has not chosen to protect NADIN in their FY 86 Budget and FSS automation is in trouble.

You should know that alternative commercial weather radar displays are available today.

Meanwhile, with no alternative weather radar displays in the NASP, (except for the unwieldly Remote Radar Weather Display System (RRWDS) in limited deployment), the working controller and FSS specialist will conceivably have no color weather radar display at his work station for at least 5 years. As you know, the House Oversight Subcommittee Report, "The Impact of Weather on Aviation Safety," is especially critical of the FAA's inability to produce actual progress in weather programs; the system's ability to transmit hazardous weather information to pilots in a timely manner; and the lack of adequate weather radar at the controller's (and the FSS specialist's) work station.

This is typified by a quote from the same report on the inadequacy of the FSS network: "Poor equipment, insufficient staffing, low morale, and passive services of the Flight Service Station are inadequate to meet the weather information needs of general aviation." AOPA agrees!

The NASP again has promised more than it has delivered: FSS automation has slipped at least 3 years and not a single station is yet equipped; alternative weather displays are ignored, while the FAA clings to a Model II concept which will someday reinvent what the private sector delivers today. Direct User Access Terminal System (DUATS) is inextricably tied to Model II which is yet to be produced.

The NASP does not address the low altitude or on-the-ground need for cockpit weather information. Not even FAA's optimistic plan for 773 FSS remote communications outlets and 200 Mode S data link transmitters will provide coverage in vast areas where weather services are not available.

The NASP clearly is not responsive to its tedious stepchild, the National Airspace Review, which recommended that all FSS in-flight services be available to the surface (and noted that satellite technology exists to do the job).

General aviation participants in last week's workshop on "Meteorological Inputs to Aviation Systems" at the University of Tennessee Space Institute also openly challenged Mode S capability to meet inflight weather requirements.

COST/BENEFIT

It was once claimed that the cumulative effects of AERA, AAS and Mode S would yield a cost/benefit ratio of 5:1. Recent internal FAA studies (to be released in June 85) suggest that 2:1 may be more realistic and the assumptions on which the analysis is based suggest that it too is overly optimistic. In addition to the 97% Mode S equippage and fully implemented AERA III, which the study assumes to be in place, I question Area Control Facility benefits as well.

The method of figuring the value of Area Control Facility implementation must be questioned. I suspect that fuel savings computed at $2.86 per gallon and passenger delays at $20.50 per hour may be unsupportable. The fuel savings (for the most part) accrue to metering anyway (and can be done by the Host Computer in the existing TRACON/center system) and may not be appropriately included in ACF figures.

On the FAA side, productivity benefits alleged to accompany Area Control Facility are related to ETABS with a 600-700 person reduction in staff and AERA implementation. I think that personnel reduction will be offset by increased computer personnel requirements. It is not'clear how analysis of AERA benefits were tabulated, but at least part of the benefit must be attributable to Host computer, not Area Control Facility.

The subcommittee must determine if ACF continues to represent a major element of the cost/benefit dividend.

In a recent "quick and dirty" comparison of Flight Service Station cost/benefit we found that FAA had mislead Congress on annual savings that could be expected from its Flight Service Station plans. Their estimates of annual operating cost reductions for Flight Service Stations suggested that they could operate flight service in 1985 for 161 million (constant 1981 dollars). The FAA anticipates a further reduction to 150 million by 1990.

However, last year we made the assumption of 4.5% inflation rate for 1984. Inflation didn't reach that level, but at 4.5% we estimated that FAA will operate FSS for only 148 million 1981 dollars, without any modernization or staff reductions whatsoever.

The obvious question is: What validity do FAA's proposed cost savings have when they are saving money by doing nothing?

CONCLUSION

The NASP is not based on stated user needs. It does not exploit new technologies, is in fact frozen at 1981 or earlier state-of-the-art, and ignores satellites. There is little hope that the NASP will increase system capacity.

AOPA questions that the NASP represents a cost effective architecture that will meet even today's valid user operational requirements, much less tommorrow's.

The failure, or partial failure, of such programs as AAS, FSS Automation and Mode S and the impact of delaying elements of those major entities demands that this committee seek a careful and objective review of the cost/benefit analysis which justifies the major building blocks of the NASP.

I am convinced that NASP is flawed. Its technology snapshot is obsolete.

Your oversight authority has a fleeting chance to input new technology before it is too late. It is a unique opportunity! NASP delays and the end of the 5-year budget authorization coincide to permit a thorough review and, if warranted, action to redirect the NASP.

I think that Mr. Helms suggested a logical approach - identify valid user needs, assess technology and then plan the transition and implementation. The NAS today is as safe as it can be made without capricious action. Elements of the NASP which improve Communications, Navigation and Surveillance coverage, increase access to airspace or airports should be retained.

A renewed look at satellites is necessary and an effective architecture needs definition. Incentive to equip should be predicated on improvement in meeting users' CNS needs - not on mandatory carriage of equipment that meets FAA needs.

AOPA also believes valid arguments exist for tasking NASA or a new qualified entity to do ATC research and development. FAA's vested interest and questionable expertise in this area suggest that this activity might more efficiently and objectively be accomplished elsewhere.

Administrator Engen inherited the NASP and its problems. I think he believes it is time to take a hard look at many of the programs and solve the problems. He has indicated that he will respond to input from the user community. The NASP has reached a critical point and should not be permitted to proceed until questions of user requirements, system architecture, alternative technologies and cost effectiveness are resolved. You have the opportunity to ask the FAA to address these important issues. I think that the Administrator is objective enough to urge them to do so!

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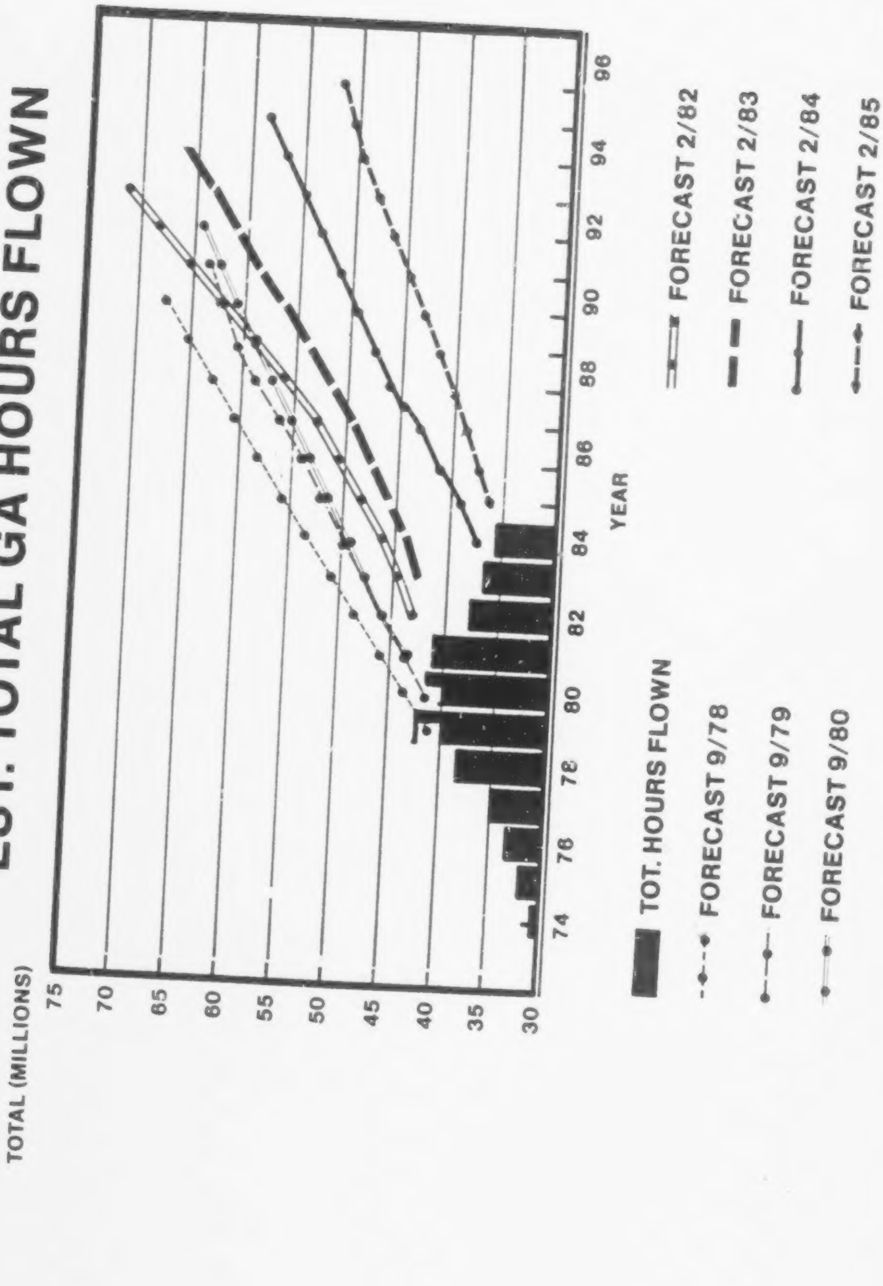
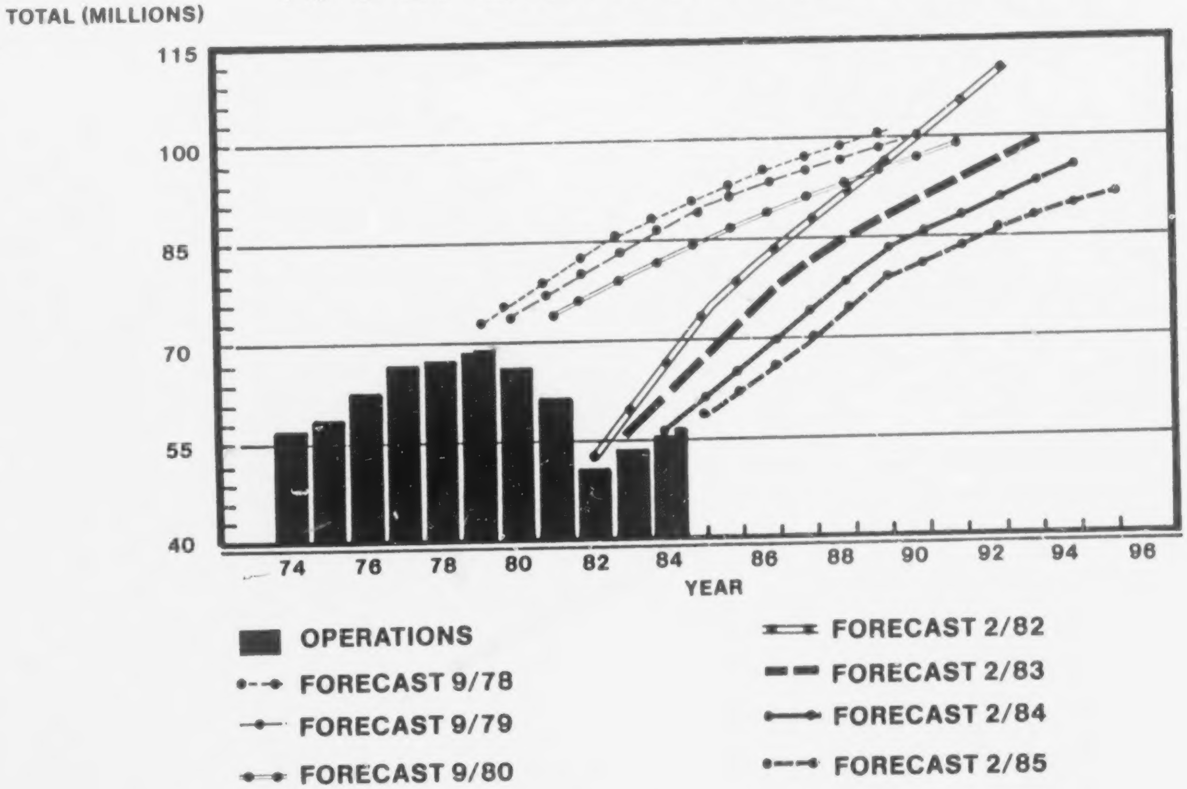


A/C OPERATIONS VS FORECAST



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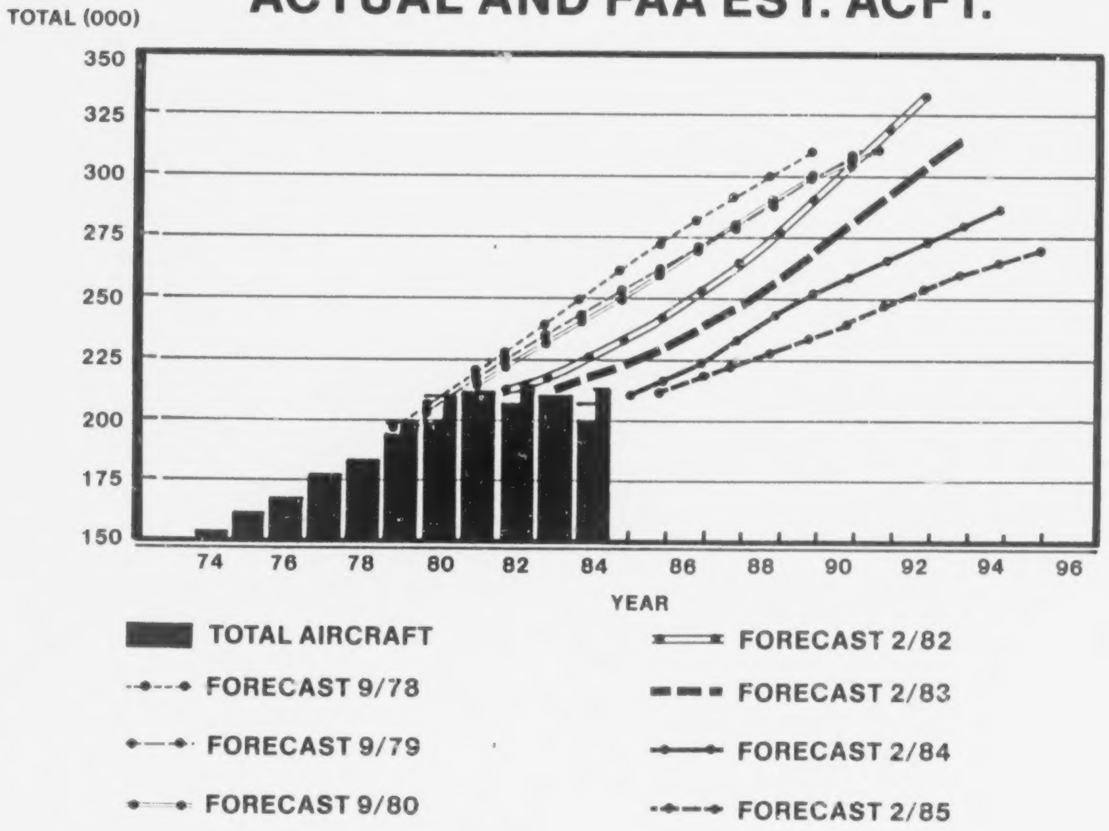


Mr. GLICKMAN. OK. Thank you very much.

And Mr. Cooke.

Mr. COOKE. Yes, Mr. Chairman. I'm Robert Cooke of National Business Aircraft Association.

With me today is Dennis Wright.

I'm very pleased to be here, Mr. Chairman, and I've found that I've learned a lot coming up here to be with you in this committee. I hope occasionally I may teach a little nugget every now and then.

Last year—on July 24 of last year—1984—on hearings on aircraft navigation and landing technology, I brought with me two expert witnesses from the NBA membership—Mr. Gil Quinby, you may recall, who discussed the MLS Program, and Mr. Myron Collier, who discussed the use of area navigation systems in the United States.

Quite frankly, a full analysis of the FAA budget is beyond the capacity of our association's resources. Just today, for example, we've gotten our first peek at the budget justifications that are prepared by the FAA.

So I'd like to just discuss three programs with you today, and tell you about our concerns on the microwave landing system, the flight service modernization, and the automated weather observation systems.

The administrator, in his testimony, referred to ancillary programs, which I think are where the knocks are going to be taken, if you will, in budgeting, and I assure you that we'll have a hard look at what those ancillary programs are.

There are three programs that I want to talk about that we feel have suffered some measure of faulty management, misplaced priorities, and perhaps political fumbling.

Last year, for example, we were briefed by FAA that the installation of MLS would commence in early 1986, and we are now concerned that this is one of the programs that will suffer a stretchout.

Last year, we were concerned that FAA's implementation program—we were concerned about it and offered to the FAA an alternative program which, in our opinion, would have provided for a measurable income—increment of safety and aeronautical capability.

I've attached to my statement, Mr. Chairman, copy of letters that were sent in 1984 to the FAA, where we offered for their consideration a program that would have, in our opinion, optimized the benefits from MLS installation. We were very concerned about the direct substitution of MLS for ILS as providing no increment of increase in aeronautical capability, which precipitated that letter.

And in the case of flight service station modernization, we feel that this is a program that we have to simply get on with and face up to the remaining problems.

The first problem, of course, is the consolidation, and we're very pleased to hear the administrator's comments on the settling on the 61 stations plus an additional 52 stations over and above the consolidated ones.

There will be some who will be inconvenienced in the consolidation, but we should not let the few who are inconvenienced stop the majority from the full benefit of the automated flight service station.

The second problem is to impress the FAA with the importance of this program to the Nation's flying community, and I feel, as a result of the testimony today, that the administrator does have that sense of importance for the program, and I'm more assured after today's learning session, if you will, that that program is going to get proper attention.

With respect to the automated weather observation system, the need for period observation at certain airports is probably the most critical for business aircraft operations today, and it appears to us that progress is going in the other direction.

There are fewer and fewer airports that are—are providing the full service of weather observation—towers are being closed; flight service stations, as part of the program, are being removed, so that the network of observation, if you will, is being reduced.

We had thought that the development of automated weather observation systems would promise a modern technological solution of that problem, but it unfortunately seems that the automated weather observation system is one of those programs—those ancillary programs that's going to suffer postponement of implementation; that's a concern of ours.

We feel that the safety of the Nation's air travelers cannot wait until additional sensors are developed that will provide the information which is most difficult to measure.

We'd like to see equipment to be deployed now that measures what the capability to measure is now, and then perhaps in a modular—modular fashion add on to that the more difficult factors.

Mr. Chairman, aviation users have been subjected to taxation now for 15 years, and since 1982 of course we've had a plan, if you will—a road path—but we've also been paying significantly higher taxes to follow that—that road plan.

The current administration—and this is to our dismay—promised solutions if we would put up the money, and the money's being put up of course, but now it seems to be following the pattern set by all previous administrations, which is to treat the money as if it were its own and make decisions without consultation with the users.

Congress, too, has not always been faithful to the agreed goals, and we strongly support the expenditure of the monies in the trust fund to provide for the aeronautical needs and safety in the system, and I thank you very much, sir.

[The prepared statement of Mr. Cooke follows:]

PREPARED STATEMENT OF ROBERT A. COOKE

Dear Mr. Chairman:

The National Business Aircraft Association, Inc., (NBAA), represents business aviation in the United States and consists of more than 2900 companies operating more than 5200 aircraft as a means of facilitating the normal conduct of their day-to-day business activities.

Many of the companies we represent are at the forefront of American business. As proof, we offer the statistic that of the 363 companies listed among the 1983 Fortune 500 industrials which operate aircraft, 329 are members of NBAA. We also represent the aviation interests of many smaller companies which own and operate single- and twin-engine piston aircraft. Business aircraft operators are convinced of the utility of aircraft and use their aircraft to expand business territories and opportunities. That utility is treatened through the continued inaction and misdirection of resources with respect to airport and airway development which began in the late 1960's. Fortunately, Congress approved and enacted mechanisms to fund a large scale development program in 1982. The National Airspace System Plan or NASP, should bring tangible results in the form of enhanced capabilities in the airspace through modernization and automation. However, system improvement has not preceeded as planned and, in our view, the plan may never be fully implemented. This problem is particularly distressing when considering the airspace congestion which occurred last year and which may reoccur this year. We have strongly supported NASP implementation because, over the long term, it is our best hope to solve these many problems. Slowed implementation has exacerbated the problems.

We appreciate this opportunity to appear and present this statement on behalf of our membership.

The capacity of the existing Air Traffic Control system is being exceeded in certain areas. As a result, artificial contraints are being imposed upon operators of all classes of aircraft in an attempt to ensure system efficiency. The artifically imposed air traffic control delays are a routine experience in some areas of the country. Further, the delays are often imposed on aircraft thousands of miles away from the specific area experiencing the problem.

These problems are difficult ones indeed. They result from years of benign neglect on the part of successive Administrations and Congresses. They can however, be remedied. The remedy is a forthright one; appropriate the money collected from the system's users and pay for the expansion and modernization set forth in the FAA's National Airspace System Plan (NASP), approved by Congress in 1982, and for the Airport Improvement Program (AIP).

Since 1982, airline ticket holders, air freight users and private aircraft operators have been paying substantially increased user taxes levied specifically to finance airport development and to modernize the National Airspace System. Yet, while the taxes have been paid by the users and collected by the government, the needed monies have not been appropriated. In fact, as of December 31, 1984 an estimated 7.0 billion dollars is idle in the Airport and Airways Trust Fund. All this while the system ages, adequate service is not provided to users, and the NASP goes underfunded by an estimated $1.1 billion to date.

We believe the NASP is an essential, urgently required capital investment program. It is absolutely imperative that Congress, the Administration and the users stay the course, maintain funding levels that do not stretch out the program and sustain program momentum right through implementation. Failure to appropriate the money and continue with implementation will result in the Air Traffic Control System continuing to show ever more distressing signs of overwork and old age.

Without adequate appropriations, delays will become more widespread, artificial contraints by regulation or legislation will be necessary to maintain adequate levels of safety and cost of transportation to passengers, shippers and mail customers will climb.

Even through the associations such as NBAA represent those who put up the money for system development, we can never seem to get timely and authorative information on FAA's line item budget. The only information we have this year is from a very non-specific briefing that was provided by the FAA last month at a symposium hosted by the Air Traffic Control Association. At that time we learned that there are a number of NASP programs that FAA intends to "protect". These programs are:

Host Computer
Advanced Automation System
Airport Surveillance Radar Replacement
Airport Surface Detection Equipment
Systems Engineering & Interation
Next Generation Weather Radar (Nexrad)
Voice Switching and Control System

Logically then, can we conclude that all the other NASP programs are suffering reduced funding, which means stretch out. Unfortunatly, the programs listed above provide primary benefit to the FAA - not the user. All the programs that provide primary benefit to the users are suffering reduced funding and stretch out - thus further postponing the accrural of the benefit to users.

The following are a few of the stretched out programs which we are most concerned with.

PRECISION APPROACH CAPABILITY

When Congress approved the NASP, it also approved installation of the Microwave Landing System, or MLS, an electronic precision approach system designed to replace the current ILS or Instrument Landing System as the nation's precision approach aid. Proliferation of precision landing capacity can spread the demand over more airports, if implemented. In 1983, FAA made an arbitrary policy decision that no new ILS equipment, including some already in the agency's pipeline, would be approved for installation due to the anticipated purchase of MLS. Because of continued delay in funding the NASP, and thus in procurement of MLS, many airports across the nation still lack the precision approach capability for which they are qualified. The situation is a travesty, impacts adversely on the safety, efficiency and capacity of the air transportation system and is another direct result of the Administration's vacillating support and Congress' failure to fund the NASP. Lets look at the MLS program.

When FAA's plans were finally exposed for public scrutiny, we learned FAA planned to install many of the first MLS systems at airports which already possess precision approach capabilities. We took strong exception to a direct duplication policy would result in no net gain in the number of locations with precision approach capability in our air transportation system. One year ago we joined with other aviation groups to ask FAA to take two actions to alleviate this obvious capacity-limiting problem. First, in effort to quickly catch up with the widening short fall of locations that desperatly need precision approach capability we recommend FAA purchase a few ILS systems to be installed at those airports which are eligible to receive their first precision approach equipment but had their plans aborted by the arbitrary FAA policy. The second recommendation is to modify the proposed installation schedule of the MLS program. This would concentrate the initial buy of MLS equipment at those airports which currently have no precision approach capability, or those which have higher weather minimums for existing ILS procedures because of terrain, or those which have siting problems unique to the airport but which MLS is designed to alleviate. We append copies of both the letters written on this subject and respectfully ask that they be included in the record. At the present time we have been overtaken by events because the program has slipped, but we will continue to press for an intellegent implementation program which will serve aviation's need beyond simple substitution for ILS.

If FAA were to adopt our recommendation, more airports would receive precision approach capability sooner, thereby affording a significant increase in the number of airports with precision approach capability usable by all flights; air carrier, commuter, air taxi and business aviation. A mere substitution program does not expand the precision approach capability, nor provide a quantum step toward a safer, more efficient air transportation system.

FLIGHT SERVICE STATION MODERNIZATION

As this Subcommittee is fully aware, one portion of the NASP concerns the consolidation and modernization of the existing Flight Service Station network from a decentralized, labor-intensive system using technology which was obsolete in the 1950's, into one which is capable of providing near real-time weather information almost instantaneously. The planned system will cost less in the long run, be more efficient of both the pilot's and the briefer's time and make full use of modern electronics and communications.

We strongly endorse modernization of Flight Services. The current Flight Service Station Modernization and consolidation program has been bouncing around the inside of FAA for years. As we understand it, the automation hardware has been built, the new FSS building program is under way and that there are a number of buildings completed and standing empty, and FAA's lack of attention to the supervising the contractor has resulted in outrageous delays to software development.

We simply have to get on with this program, and face up to the two remaining problems. The first is consolidation. Consolidation of the FSS's has become a political football. In any plan to consolidate facilities, there will be some who will be inconvenienced. We cannot let the few that will be inconvenienced stop the majority from obtaining the benefit of a fully automated Flight Service Station System. The second problem is impressing FAA with the importance of this program to the nation's flying community. When airborne, there is no alternative to the FSS for the provision of flight services.

AUTOMATED WEATHER OBSERVATION SYSTEMS

The need for periodic observation of the weather at certain airports is the most critical need of business aviation today. Unfortunately, progress toward improvements in weather observation seem headed in the wrong direction. Rather than moving toward more frequent observation at greater numbers of airports in the United States, we suffer a continual decline in the number of locations where periodic weather observations are made. With the loss or reductions of personnel at low activity Air Traffic Control Towers, and the modernization and consolidation of the Flight Service Station system, this number is expected to decrease even further. Still unanswered is the continuing requirement for weather observations at airports with a high incidence of business aviation activity and no current or planned control tower or FSS to provide weather observations.

Additional observing locations should improve the area and terminal forecasts, as well as supporting the continual need for current weather at many locations.

Development of automated weather observation systems once seemed to promise modern technological solutions to this problem. Unfortunatly, AWOS seems to be one of the programs that continually suffer postponement of implementation.

It appears that the simple part of the solution, say the measurement and periodic transmission of wind velocity information, must await bureaucratic consensus on how best to accomplish the more esoteric parts such as the measurement of cloud height and coverage.

We urge the immediate deployment of automated weather observing equipment that provides any of the following, (rank ordered here as to importance):

*1. Altimeter setting (barometer)
*2. Wind Velocity and direction
3. Visibility or visual range
4. Cloud height (when at below 5000' AGL)
5. Temperature

* The operational evaluation of WAVE (Wind Altimeter and Voice Equipment) at Frederick Municipal Airport, MD proved to be of great value to aircraft operators and was widely accepted by the general aviation community.

The safety of the nations air travelers cannot wait until additional sensors are developed that will provide the information that is most difficult to measure. The equipment deployed should be a modular design so that additional sensors can be added at a later date, but the entire credibility of the weather information system is in the balance unless something is provided soon.

AIRPORT INVESTMENT

Funding for airport improvement through the Airport Improvement Program is also critical to future growth in aviation. The High Density Rule (FAR Part 93 Subpart K), while being carried out in the airspace, was created due to concerns about congestion, it is not a problem without a solution. Existing airports with congestion problems can alleviate a great amount of these problems by building expanded facilities for parking and servicing aircraft, lengthening runways, building additional and wider taxiways and by building new, shorter runways to accomodate aircraft capable of shorter take-offs and landings. Former FAA Administrator Lynn Helms proposed building 3000 foot-long runways parallel to existing ones in order to relieve the pressure on the longer, main runways which in many cases must perforce be used for all aircraft.

Additional uses for AIP funds would be to improve the status of reliever airports in this country. Although many facilities have been officially designated as "relievers" making them eligible for special funding, the money is not flowing to them as it should because it has not been appropriated. We must emphasize that this is the case not because the money is not in hand; it is. It is because the Administration and Congress have failed to spend the money collected from aviation users.

Aviation users have been subjected to taxation to provide for the development of out nation's airports and airways for fifteen years. Since 1982, aviation operators have been paying significantly higher taxes to accomodate the need for rapid modernization of the system. To our continuing dismay, the current administration which promised solutions if only the users would put up the money continues to follow the pattern set by all of its predecessors by treating the money as if it were its own, and the operators as if their counsel was of no regard. The Congress too has not always been faithful to our agreed goals. The programs which take the brunt of budget cutting always seem to be those programs which offer fulfillment of essential safety and efficiency needs. We would expect that there might be some small differences between administrations' goals and ours, but certainly not to the extent of out concerns with the three programs we have highlighted here today.

Thank you for the opportunity to present this statement.

April 2, 1984

The Honorable Michael J. Fenello
Acting Administrator
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Fenello:

The aviation organizations listed below have recently cooperated in a thorough review of the FAA's MLS implementation plans. The review was sparked by our concerns about the proposed sites listed in the MLS contract.

Our first analysis of FAA's planned installations showed that nearly all of the initial "buy" would, in fact, be serving runways already equipped with ILS. We unanimously agreed that this approach to MLS implementation would result in a very small gain in total precision approach capability for many years. We therefore undertook an airport-by-airport review of the implementation program and came to agreement on a proposed list of candidate locations (attached) for installation of early MLS equipment.

The thrust of our logic has been that the key criteria used for selecting airports and heliports for new precision approaches should be safety and aeronautical need. The U.S. Congress, in the Airport and Airway Improvement Act of 1982, stated that an airport receiving commercial air service should have the highest degree of safety, and to the extent possible, a precision approach system. The FAA's Satellite Airport Program was designed to enhance the safety of busy airports by attracting some air traffic to other nearby airports. Accordingly, we have included those designated Satellite Airports, Essential Air Service Points, and Commuter Airports which have no precision approach in our list of MLS first "buy" locations. All of these airports/heliports have previously identified safety needs.

Aeronautical need includes, but is not limited to, increased airport capacity, increased Air Traffic Control (ATC) flexibility, reduced community noise exposure, reliable and increased commercial air service, provision for non-interfering helicopter and STOL operations, and reduction of traffic delays and congestion. While considered separate criteria, meeting these aeronautical needs also results in enhanced safety. We have therefore included Reliever Airports with more than 300 based aircraft and no precision approach, airports/heliports that are near capacity or have reached capacity, and certain locations where an MLS would result in lower approach minimums than are now possible. We do not recommend dual ILS/MLS installations for this first "buy" except at locations where the ILS is restricted due to facility performance or where capacity and/or ATC flexibility could be increased. In most cases, an MLS location justified on the basis of safety can also be justified on the basis of aeronautical need.

Finally, we have included a number of airports that, at one time, qualified for their first ILS approach under Aeronautical Planning Standard One (APS-1), but were cancelled when the MLS program was announced. Although we believe these locations should have ILS installed, as indicated in our letter to you dated February 14, 1984, they should promptly receive an MLS if an ILS is not installed. The fact that these airports previously qualified for a precision approach under APS-1 indicates that the return of traffic and future growth can be expected at that location when the industry fully recovers from the recent recession. Aeronautical need at these locations, therefore, can be best filled by installing precision approach equipment, even if the airport does not currently qualify under APS-1 criteria.

By providing MLS precision approach guidance at the airports and heliports we have suggested, the early design and use of low cost airborne receivers will be fostered. As these receivers are placed in service, the safety, capacity, and flexibility of the nation's air transportation system will be enhanced with a significant number of precision approaches being conducted at additional airports and runways. We believe those users whose operations would clearly benefit from the use of MLS will voluntarily equip their aircraft accordingly.

We would be glad to discuss this further with you or members of your staff at your convenience.

Air Line Pilots Association
John O'Brien

Roger Fleming

Air Transport Association
J. Roger Fleming

Charles Barclay

American Assoc. of Airport Executives
Charles Barclay

Edward W Stimpson

General Aviation Manufacturers Assoc.
Edward W. Stimpson

Helicopter Association International
Frank L. Jensen, Jr.

Lawrence L. Burian

National Air Transport Association
Lawrence L. Burian

Joseph G Mason

National Assoc. of State Aviation Officials
Joseph G. Mason

National Business Aircraft Assoc.
John H. Winant

Regional Airline Association
Duane H. Ekedahl

April 2, 1984

JOINT INDUSTRY RECOMMENDATIONS FOR FIRST BUY MLS LOCATIONS

LEGEND

(1) Essential Air Service (EAS) point.

(2) Reliever Airport with 300 or more based aircraft.

(3) FAA designated "Satellite" airport.

(4) FAA designated "Commuter" airport that was selected to receive an ILS.

(5) Served by a commuter and should be considered for precision approach.

(6) Location that was included on aviation associations list to receive ILS equipment (see letter to Mr. Fenello dated February 24). These locations should receive a first buy MLS only if the ILS equipment is not provided.

(7) Location that was on FAA original list for first buy MLS that cannot obtain ILS, i.e., problem site.

(8) Regional input indicates valid requirement for first buy MLS.

(9) Selected major airports where the addition of MLS will increase capacity/flexibility, i.e. stub runways, short runways, helicopter landing areas, or runways with no ILS at all.

STATE & CITY	CURRENT APPROACH CAPABILITY OR MLS RUNWAY
ALABAMA	
Birmingham - BHM (7)	MLS runway 23 (LOC Only)
Gadsden - GAD (4)	VOR
Selma - SEM (6)	VOR
ARIZONA	
Douglas - DUG (5)	VOR/DME
Flagstaff - FLG (1)	VOR/DME
Kingman - IMG (1)	VOR
Lake Havasu - LHU (1)(4)	VOR/DME-A
Mesa/Falcon Field - P16 (2)	NDB
Page - PGA (1)	VOR-A
Phoenix/Deer Valley - DVT (2)	NDB
Winslow - INW (1)	VOR
ARKANSAS	
Camden - CDH (5)	VOR/DME
El Dorado - ELD (1)(4)	LOC/OM
Fayetteville - FYV (1)(4)	LOC/OM

STATE & CITY	CURRENT APPROACH CAPABILITY OF MLS RUNWAY
ARKANSAS	
Harrison - HRO (1)(4)	LOC/OM
Jonesboro - F88 (1)(4)	VOR
West Memphis - AWM (6)	VOR/DME-A
CALIFORNIA	
Blythe - BLH (1)	VOR/DME
Burbank - BUR (7)	MLS Rwy 07 (Restricted ILS)
Concord - Buchaanan Field - CCR (2)	LDA
El Monte - EMT (2)	VOR/DME-B
Eureka - EKA (6)	VOR
Fullerton - FUL (2)	LOC
Hawthorne - HHR (7)	MLS Rwy 25 (LOC only)
Imperial - IPL (5)	VOR
Inyokern - IYK (4)	None
Lake Tahoe - TVL (1)	LDA/DME
Mammoth Lake - MMH (6)	None
Ontario - ONT (7)	MLS Rwy 26R (LOC only)
Palm Springs - PSP (5)	VOR/DME
Palo Alto - PAO (2)	None
Red Bluff - RBL (6)	VOR/DME
San Carlos - SQL (2)(3)	None
San Diego - Gillespie - SEE (2)(3)	None
San Francisco Intl. - SFO (9)	MLS Rwy 19R/01R
San Jose - Reid - Hillview - RHV (2)	None
San Luis Obispo - SBP (1)(4)	LOC
Santa Monica - SMO (2)	LOC
Tracy - 036 (3)	VOR-A
Upland/Cable Field - CCB (3)	VOR
COLORADO	
Alamosa - ALS (1)(4)	VOR/DME-B
Colorado Springs - COS (7)	MLS Rwy 35 (Restricted ILS)
Cortez - CEZ (1)(4)	VOR
Denver - DEN (9)	Rwy 8L
Gunninson - GUC (1)	VOR
Lamar - LAA (1)	VOR
Montrose - MTJ (1)(4)	VOR
Steamboat - SBS (5)	None
DISTRICT OF COLUMBIA	
Washington National - DCA (7)(9)	MLS Rwy 18 (LDA/DME with glideslope)
Washington National - DCA (9)	MLS Rwy 33

STATE & CITY	CURRENT APPROACH CAPABILITY OR MLS RUNWAY
FLORIDA	
Jacksonville/Herlong - 23J (3)	None
Key West - EYW (1)	VOR
Marathon - MTH (4)	NDB
Mariana - MAI (6)	VOR
Naples - APF (4)	VOR/DME
Punta Gorda - PDG	VOR
Vero Beach - VRB (4)	VOR/DME
GEORGIA	
Athens - AHN (6)	VOR
Augusta/Daniel - DNL (6)	VOR
Lawrenceville - 17A (6)	VOR/DME
Moultrie - MGR (1)	VOR
IDAHO	
Caldwell - U35 (2)	None
ILLINOIS	
Romeoville/Lewis Univ. - LOT (2)	VOR
Waukegan - UGN (6)	LOC
INDIANA	
Elkhart - EKM (1)	SDF
IOWA	
Clinton - CWI (1)(4)	LOC/OM
Iowa City - IOW (6)	VOR
KANSAS	
Dodge City - DDC (6)	VOR/DME
Garden City - GCK (1)(4)	LOC/OM
Great Bend - GBD (1)(4)	LOC
Hays - HYS (1)(4)	LOC
Lawrence - 3LA (4)	VOR/DME-A
Parsons - PPF (1)(4)	VOR
KENTUCKY	
London - LOZ (6)	VOR/DME
Louisville/Bowman - LOU (2)	VOR
Murray - CEY (3)	NDB

STATE & CITY	CURRENT APPROACH CAPABILITY OR MLS RUNWAY
LOUISIANA	
Patterson - PTN (1)(4)	LOC/DME
Houma - HUM (4)	LOC
MAINE	
Watterville - WVL (6)	LOC
MASSACHUSETTS	
Beverly - BVY (6)	LOC
Boston - BOS (9)	MLS Rwy 27; 22R
Hyannis - HYA (7)	MLS Rwy 24 (Restricted ILS)
Plymouth - PYM (3)	VOR
MARYLAND	
Baltimore - BWI (9)	MLS Rwy 15L/33R
Cumberland - CBE (1)(4)	LOC-A
MICHIGAN	
Fremont - 3FM (6)	VOR
Manistee - MBL (6)	VOR
Menominee - MNM (1)	VOR
Port Huron - PHN (6)	VOR/DME-A
MINNESOTA	
Fairmont - FRM (1)	VOR/DME
Mankato - MKT (1)	LOC
Minneapolis/Flying Cloud - FCM (2)	LOC
Worthington - OTG (1)	VOR/DME
MISSISSIPPI	
Natchez - HEZ (1)(4)	LOC
MISSOURI	
Ft. Leonard Wood - TBN (1)(4)	LOC
Jefferson City - JEF (4)	LOC
Kaiser/Lake Ozark - AIZ (4)	VOR
Kirksville - IRK (1)(4)	LOC
Poplar Bluff - POF (1)(4)	SDF
St. Louis - STL (9)	MLS Rwy 12L; 17

STATE & CITY	CURRENT APPROACH CAPABILITY OF MLS RUNWAY
MONTANA	
Glasgow - GGW (1)(4)	VOR
Glendive - GDV (1)	NDB
Harve - HVR (1)	VOR
Lewistown - LWT (1)	VOR
Miles City - MLS (1)	VOR/DME
Sidney - SDY (1)	NDB/DME
Wolf Point - OLF (1)	NDB
NEBRASKA	
Alliance - AIA (1)(4)	VOR
Chadron - CDR (6)	VOR
Columbus - OLU (1)(4)	LOC
Hastings - HSI (6)	VOR
Kearney - EAR (1)(4)	LOC
McCook - MCK (6)	VOR/DME
Sidney - SNY (1)	VOR/DME
NEVADA	
Elko - EKO (1)	VOR/DME-B
Ely - ELY (6)(1)	VOR/DME-C
Henderson - L15 (6)	None
NEW HAMPSHIRE	
Laconia - LCI (6)(1)	LOC
NEW JERSEY	
Atlantic City/Bader - AIY (1)	VOR
Caldwell - CDW (6)	NDB
Cape May - WWD (5)(1)	LOC
Newark - EWR (9)	MLS Rwy 29; 11
Teterboro - TEB (9)	MLS Rwy 1; 19 or 24
NEW MEXICO	
Alamogordo - ALM (1)(4)	VOR
Clovis - CVN (1)(4)	LOC
Gallup - GUP (1)(4)	LOC
Silver City - SVC (1)(4)	LOC/DME
NEW YORK	
Brookhaven - 1N1 (6)	VOR
Ogdenburg - OGS (1)(4)	LOC
Oneanta - N66 (4)	LOC

STATE & CITY	CURRENT APPROACH CAPABILITY OR MLS RUNWAY
NEW YORK	
New York - JFK (9)	MLS Rwy 13R
New York - LGA (9)	MLS Rwy 13 (if MLS can provide increased capacity by reducing interaction with TEB traffic)
NORTH CAROLINA	
Greenville - PGV (4)	SDF
New Bern - EWN (1)(4)	LOC
OHIO	
Akron/Fulton - AKR (3)	LOC
Dayton General - MGY (6)	LOC
Toledo/Metcalf - TDZ (6)	VOR/DME
OKLAHOMA	
Enid - WDG (1)(4)	LOC
McAlester - MLC (1)	LOC
Ponca City - PNC (1)	LOC
Stillwater - SWO (1)	VOR
Tulsa/Jones - RVS (6)	VOR
PENNSYLVANIA	
Pittsburgh - PIT (9)	MLS Rwy 14; 28C
Philadelphia - PHL (9)	Rwy 17
RHODE ISLAND	
Newport - 2B4 (5)	LOC
Westerly - WST (4)	LOC
SOUTH CAROLINA	
Hilton Head - 49J (4)	RNAV
SOUTH DAKOTA	
Brookings - BKX (1)(4)	VOR
Mitchell - MHE (1)(4)	VOR
TENNESSEE	
Clarksville - CKV (1)(4)	LOC
Knoxville/Downtown - DKX (3)	LOC

STATE & CITY	CURRENT APPROACH CAPABILITY OR MLS RUNWAY
TEXAS	
Brownwood - BWD (1)(4)	LOC
Houston/David Wayne Hooks - DWH (2)	LOC/DME
Houston - IAH (9)	MLS Rwy: 14R/32L
McKinney - TKI (6)	VOR/DME-A
Paris - PRX (1)(4)	VOR
UTAH	
Cedar City - CDC (6)(5)	VOR
Logan - LGU (1)(4)	VOR
Moab - CNY (1)	VOR/DME
Salt Lake City Muni - U42 (2)(3)	ASR Only
St. George - SGU (1)(4)	VOR/DME
Vernal - VEL (1)(4)	VOR
VERMONT	
Montpelier - MPV (1)	LOC
Rutland - RUT (1)	LDA
Springfield - VSF (6)	LOC
VIRGINIA	
Danville - DAN (1)(4)	LOC
Roanoke - ROA (7)(9)	MLS Rwy 05 (LDA with glideslope)
WASHINGTON	
Burlington/Mt. Vernon - 75S (4)	None
Pullman - PUW (1)	VOR
Renton - RNT (6)	NDB & RNAV
Spokane/Felts - SFF (6)	VOR
Wenatchee - EAT (5)(1)	VOR-A
WEST VIRGINIA	
Clarksburg - CKB (7)	MLS Rwy 21 (Restricted ILS)
Elkins - EKN (1)	LDA-C
Greenbriar - SSU (1)	VOR-A
WISCONSIN	
Hayward - HYR (1)(4)	VOR/DME
Manitowac - MTW (6)	VOR
Marshfield - MFI (1)(4)	SDF
Sheboygan - SBM (5)	VOR
Wisconsin Rapids - ISW (1)(4)	SDF

STATE & CITY	CURRENT APPROACH CAPABILITY OF MLS RUNWAY
WYOMING	
Cody - COD (1)(4)	VOR-A
Gillette - GCC (4)	LOC
Laramie - LAR (1)(4)	VOR/DME
Worland - WRL (1)(4)	VOR
ALASKA*	
Anaktuvuk Pass - AKP	
Anchorage/Merril Field - MRI	
Aniak - ANI	
Barrow - BRW	
Delta -	
Dillingham - DLG	
Dutch Harbor - DUT	
Galena - GAL	
Homer - HOM	
Kenai - ENA	
Kotzebue - OTZ	
McGrath - MDG	
Nome - OME	
Northway - ORT	
Fok -	
Port Heiden - PTH	
Seward - SWD	
Sparevohn -	
Vethul -	
Deadhorse-	

* From a list submitted by the Alaska Air Carriers Association

RECEIVED
FEB 29 1984
N.B.A.A.

February 24, 1984

The Honorable Michael J. Fenello
Acting Administrator
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Dear Mr. Fenello:

We would like to bring to your attention a matter that could significantly improve the safety and utility of the nation's air transportation system.

The abrupt discontinuance of ILS installations and the gradual phasing-in of the MLS will force airports that are now qualified for their first ILS to wait until an MLS is available. This could take up to ten years. The nation's air transportation system cannot wait this long for the increased safety, utility and capacity that new precision/localizer approaches bring. In the short term, the initial installation of MLS should not be expected to result in the same benefits that an ILS could offer. This is because most of the nation's aircraft are not yet equipped with MLS receivers.

Attachment 1 lists those airports that had previously qualified for a full or partial ILS, have no other ILS approach, and were dropped from the ILS installation list. We recommend that the FAA reprogram ILS's purchased to replace tube-type ILS equipment and furnish a new ILS to those airports in Attachment 1, provided these airports still meet normal ILS establishment criteria.

By using ILS equipment that has already been contracted, these airports can receive a new ILS promptly and with minimum FAA expenditures. By reprogramming ILS's only to those airports that had their first ILS cancelled, over one hundred new ILS's will still be available to replace tube-type equipment as originally planned.

While this recommendation does not fill all of the nation's needs for new approaches, it is a significant step that solves some near term problems.

Air Line Pilots Association
John O'Brien

Air Transport Association
John E. Ralph

Aircraft Owners & Pilots
Association
John L. Baker

General Aviation Manufacturers
Association
Edward W. Stimpson

National Business Aircraft
Association
John H. Winant

Regional Airline Association
Duane H. Ekedahl

Attachment 1
Airports to Receive Reprogrammed ILS

State	Location	Runway	Requirements
AL	Selma	32	Localizer
AR	West Memphis	17	Full ILS
CA	Eureka	11	Localizer
CA	Mammoth Lakes	27	Localizer
CA	Red Bluff	33	Full ILS
FL	Marianna	36R	Localizer
GA	Athens	09	Full ILS
GA	Augusta Daniel	10	Localizer
GA	Lawrenceville	25	Localizer
IA	Iowa City	35	Localizer
IL	Waukegan	23	Glide Slope, OM/DME
IN	Valparaiso	27	Glide Slope, OM/DME
KS	Dodge City	32	Localizer
KY	London	05	Full ILS
MA	Beverly	16	Glide Slope, OM/DME
ME	Waterville	05	Glide Slope, OM/DME
MI	Fremont	18	Localizer
MI	Manistee	27	Full ILS
MI	Port Huron	04	Full ILS
NC	Monroe	05	Full ILS
NE	Chadron	02	Localizer
NE	Hastings	14	Localizer
NE	McCook	12	Localizer
NH	Laconia	08	Glide Slope, OM/DME
NJ	Caldwell	22	Full ILS
NV	Ely	18	Full ILS
NV	Henderson	36	Full ILS
NY	Brookhaven	24	Full ILS
OH	Dayton General	20	Glide Slope, OM/DME
OH	Toledo Metcalf	32	Localizer
OK	Tulsa-Jones	36L	Full ILS
TX	McKinney	35	Full ILS
UT	Cedar City	20	Full ILS
VT	Springfield	05	Glide Slope, OM/DME
WA	Renton	15	Localizer
WA	Spokane Felts	21R	Localizer
WI	Manitowac	17	Full ILS

Note: Locations requiring Glide Slope, OM/DME already have a localizer installed.

Mr. GLICKMAN. Thank you.

Mr. Sheehan, in reading your conclusion, you basically have come out four square against the NAS plan, and so what I would—without being defensive, because I think our goal is to try to figure out how best to modernize air traffic control systems, what do you recommend we do?

Mr. SHEEHAN. I think this is a wonderful opportunity for the users, the FAA, and the Congress all to say, "Let's take a step back and see where it is that we're going with this, what I contend is, outdated technology; let's take another look at it."

I think we have a good germ of an idea in this RTCA committee in SC155, looking with, I would think, a little bit more vision than the FAA did some years ago, looking to the satellites as a system that will solve a lot of these very complex problems that the FAA has gotten itself into.

So, what I'm saying is, let's not scrap all of the NAS plan, but let's take a good, long, hard look at what we have now.

Mr. GLICKMAN. Captain Howell, how do you feel about that—what Mr. Sheehan just talked about?

Mr. HOWELL. The needs of the air carrier industry and the requirements related thereto for modernization of the air space system and the corresponding plan, I think, dictate that we do need this road map, this NAS plan, but I do agree that we need to, along the way, preserve flexibility and take advantage of any new and arising technology.

However, we always must remember that, at some point in time, there is a need to stop the design and go with what you have at hand, and we may have reached that in a number of areas.

I think for the air carrier industry, the requirements of modernization were demonstrated succinctly last year during the summer months when we saw so many capacity limitations on the major hub airports, and I think that the—the needs of the two different kinds of groups—general aviation versus air carrier—must be considered very carefully in the plan.

Mr. GLICKMAN. Mr. Cooke, do you agree with Mr. Sheehan?

Mr. COOKE. I don't think we can afford to take this step back, Mr. Chairman. That's why I applaud this type of oversight, where we can get our opinions expressed and—and look at the ongoing process of developing the NASP.

We think of the NASP as the only game in town, and we'd better—we'd better play it and play it well if we're going to get the needs for—of the—the system requirements that we need right now accomplished in a timely fashion.

Mr. GLICKMAN. You know, sometimes I—I don't have nightmares over this, but sometimes I think about potential nightmares, of waking up and figuring that we've spent $10 billion on a system that we could have spent 5 percent of that for to do the same thing, or 10 percent of that for.

But then I think about the thing that is, as I think Captain Howell just said, that—that's it's weighted against never taking any action; you just—you'll be timid, and you'll never do anything because there will always be problems with what you find, and so trying to find that balance between the two, and hopefully what this committee has tried to do is to plug in enough flexibility into this system so that momentum alone isn't going to carry it, and there is a possibility for modifying it.

What worries me, Mr. Sheehan, is that you're not giving me anything precise. I mean it's fine to say, "Let's sit back and take a look at it," but what specifically?

I mean we don't like the—the hardware, the software; we don't like the Host computer; we—you know.

I mean, there are some things that, you know, we could look at, and I want to ask Captain Howell a little bit about the TCAS issue, but I—you know, the fundamental part of it has to do with the—with the hardware and software associated with moving airplanes around.

Mr. SHEEHAN. And I'm prepared to address that.

Last year, we were four square against the Host computer, if you remember. This year, we're saying perhaps the Host computer gives us a breathing spell, where we can look at the system and see what we're going to be able to use from existing technology—today's technology in the years to come.

It's our best guess that the Host computer, once it's installed, will give us 10 years of breathing room. Let's not press on into this very complicated system, known as the advanced automation system, without taking another look at what—what might be available to us in the 21st century.

Mr. GLICKMAN. OK. Now I'd like to ask Captain Howell—you—you gave me some thoughts on TCAS which are really disturbing. You're basically saying that the work on TCAS has stopped?

Mr. HOWELL. Yes, sir, it—in my opinion, at this point in time, there is very little real developmental work going on in the TCAS effort.

The stoppage arises from the fact that we're unable to proceed with the Piedmont Phase II, and I do hope that you will take the opportunity of this hearing to inquire from the FAA representatives as to why exactly that stoppage is in effect, and, frankly, I don't know the answer; I would be very delighted to hear that.

But I am aware of the fact that the Piedmont Phase II is not progressing as scheduled, and, as a result, the limited installation program is also not progressing, and those are key elements in the program.

Mr. GLICKMAN. Well, I would say that in the horrendous event that, you know, we have a mid-air collision, the public is just going to not understand why, if what you're saying is correct—why we haven't moved as ahead as we should have on the TCAS concept, particularly after all those years of fighting about what collision avoidance system we should go with, and I—that is disturbing me very much.

Mr. HOWELL. It's exactly that reason why we—we emphasize in our testimony that we think it's—it's imperative that we continue to develop the TCAS-III or what used to be called the "Enhanced TCAS-II version."

I suspect that there are some feelings within the FAA that some operational limitations associated with the minimum TCAS-II vertical—only system has caused them to want to slow down and take a good, hard look at exactly what the implementation of that system in the air carrier operations of today would mean.

It has some limitations, as I say, in the resolution advisory being vertical only as well as a rather high false alarm rate, but I don't think—just because that system has problems and we have an alternative system, we can stop working on both of them. We should push along the TCA-III if, indeed, we're seeing shortcomings of minimum TCAS-II.

Mr. GLICKMAN. Yes; you know, again, I recall the early days of this subcommittee, where we had people coming in saying that we had a very simple collision avoidance system—I think at that time it was called ACAS—and we—and, you know, there are some people in the room, obviously, who remember all of that.

But—but I guess my point is that's been 5 years, 6 years, 7 years, and the original goal behind the modernization of the air traffic control system was to prevent planes from crashing into each other, particularly in mid-air, and moving them around satisfactorily, and we're still not any closer to a collision avoidance system, and that—we'll have to talk to the FAA about that tomorrow. It's—I mean I'm glad you brought that up.

The MLS—I don't know—was it you, Mr. Sheehan, or you, Mr. Cooke, that mentioned the MLS in your testimony?

Mr. SHEEHAN. I think we both did—in different contexts, I might add.

Mr. GLICKMAN. Well, I think you mentioned it in a—in a way that you felt that the technology had passed MLS, and you didn't see that as a particularly productive landing system any more.

Mr. SHEEHAN. I didn't specifically say that it had passed that, but, again, we find that new satellite technology may hold the answer for precision landing systems for us in the future, something that will be better than MLS, something that will afford an instrument approach—a precision instrument approach to virtually every airport in the country, rather than a bulky ground installation.

This has not been proved yet, but it's being proved at this time.

Again, we don't see the true advantage to MLS, especially because of the high cost of reequipping our aircraft. ILS is perfectly good for the vast majority of our members.

Mr. GLICKMAN. But that may not be true in the air carrier industry—correct?

Mr. SHEEHAN. Oh, absolutely.

Mr. GLICKMAN. Yes.

Do you have any comments, Captain Howell, on that?

Mr. HOWELL. Yes, if—if I may, please.

There's a very definite need in the air carrier industry for precision guidance to the airports, primarily for the benefits associated with safety and also for capacity. Those needs are with us today, and I think we should not wait much longer to get on with addressing them.

Mr. GLICKMAN. Mr. Cooke.

Mr. COOKE. Yes; I would concur with that, Mr. Chairman, except that we see the benefit from the MLS coming in the proliferation to airports that are not now equipped with any precision equipment, and as far as having a box that's built, we'll go for that before we do the yet to be developed satellite system, because the need is now.

Mr. GLICKMAN. OK. Well, I appreciate all of your testimony—excellent testimony—and tomorrow we have the FAA back here again, where I intend to ask him some of the specifics raised in all of your—your points of view.

I don't mean to demean your position, Mr. Sheehan, because I worry about it. I worry about the viability of this system once completed. I just think that we have to—sometimes you just have to move in this world.

But I do—I am concerned about the rush to technology that's developing out there and whether Government, in developing a system like that, will ever be in front of the technology curve, or if we're always behind it, then there will always be the desire by some people to move out in front of it, in which case you'll never get anything done, and what you have to do is build your systems flexibly enough to be able to adapt, and that's why I asked Mr. Engen today and the other witnesses of the FAA to ensure that satellite navigational systems would be—at least the systems that we put on the board—the computer systems we put on board would be adaptable to satellite navigation, to the extent that we can. It's a very necessary thing.

Mr. SHEEHAN. I have to agree with you.

I was encouraged to hear the administrator use the words "dynamic" and "flexible" today. Those words have rarely been used in conjunction with the NASP before. So I'm encouraged.

Mr. GLICKMAN. OK. Thank you very much.

The hearing will be reconvened at 1 o'clock tomorrow.

[Whereupon, at 3:40 p.m., the subcommittee was recessed, to reconvene at 1 p.m. on Wednesday, March 20, 1985.]

OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1986 RESEARCH, ENGINEERING AND DEVELOPMENT BUDGET REQUEST

WEDNESDAY, MARCH 20, 1985

House of Representatives,
Committee on Science and Technology,
Subcommittee on Transportation,
Aviation, and Materials,
Washington, DC.

The subcommittee met, pursuant to notice, at 1:15 p.m., in room 2325, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Present: Representatives Glickman, Gordon, Lewis, Boehlert, and Packard.

Staff present: Harriet Smith, technical consultant.

Mr. Glickman. Good afternoon. Today the subcommittee resumes its oversight of the FAA's research and development activities and modernization of the Air Traffic Control System, the NAS plan. Yesterday we heard from Administrator Engen in reference to the overall directions and the fiscal year 1986 budget issue. We also heard from outside witnesses. Today we plan to look at a more detailed review of the progress of individual programs within NAS.

Mr. Lewis, do you have any opening statements?

Mr. Lewis. Thank you, Mr. Chairman.

The witnesses yesterday provided an excellent overview of the status of the NAS plan and support for the NAS plan is certainly not unanimous and not without some reservations, even from among some of its strongest supporters. However, I am encouraged that major problems are recognized and are being seriously addressed by the FAA.

Although the NAS plan is the only game in town, that should not deter us from looking at it realistically. I believe Admiral Engen is doing just that. I was pleased to hear the NAS plan characterized as a dynamic plan, one which could accommodate new technology as it is being developed and I am particularly encouraged that FAA is beginning to look at the needs for the next century.

And now, Mr. Chairman, I look forward to hearing today's witnesses describe some of the major projects which make the NAS plan work.

Mr. Glickman. Thank you.

Mr. Albrecht, it's a pleasure to have you before the committee for the umpteenth time you've been here in recent years, but we appreciate it.

STATEMENT OF AL P. ALBRECHT, ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS, ACCOMPANIED BY VAL HUNT, DIRECTOR, ADVANCED AUTOMATION PROGRAMS; NEAL BLAKE, DEPUTY ASSOCIATE ADMINISTRATOR FOR ENGINEERING; FRANK L. FRISBIE, DEPUTY ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS; MARTY POLESKI, MANAGER OF PROGRAMS ENGINEERING AND MAINTENANCE; AND LEE PAGE, MANAGER OF SYSTEMS ENGINEERING SERVICES

Mr. ALBRECHT. Thank you, Mr. Chairman, Mr. Lewis. As in the past, we sincerely appreciate the support you and the subcommittee have given us in the R&D program. This year the 1980 L complex is responsible for over $2 billion worth of appropriated resources and I thought you ought to hear from the senior FAA people who manage those programs. So, I have with me again, Mr. Frank Frisbie, Deputy Associate Administrator for Development and Logistics and NAS plan manager, Mr. Neal Blake, Deputy Associate for Engineering and in addition, Mr. Lee Page, manager of the Systems Engineering Service, Mr. Marty Poleski, manager of the Program Engineering and Maintenance Service and Mr. Val Hunt, manager of the Advanced Automation Program.

Mr. Chairman, as an aside I notice you have new members on the committee, I believe it's been perhaps a couple of years since you've been up to the Tech Center and we'd like to again issue an invitation, either singly or together to take your committee members to the Tech Center.

Mr. GLICKMAN. Well, I don't know if either Tom or Ron have been to the Technical Center at Atlantic City.

Mr. PACKARD. I have not.

Mr. GLICKMAN. I think we ought to try to work a trip out and you could probably arrange a plane to fly us.

Mr. ALBRECHT. We'll work on that problem.

Mr. GLICKMAN. And Fridays or Mondays are usually better for that kind of thing, so we'll try to do it far enough in advance.

Mr. ALBRECHT. Fine, maybe we'll get back at you.

Mr. PACKARD. Maybe it could be coordinated with the hearings down in Florida.

Mr. ALBRECHT. It's in the other direction, sir.

Mr. LEWIS. It's in the opposite direction.

Mr. PACKARD. Oh, I beg your pardon.

Mr. GLICKMAN. It's in Atlantic City. It could be coordinated with a nice, fun weekend.

Mr. ALBRECHT. Maybe we should take you to Atlantic City during those hearings, Mr. Chairman.

We have a few short presentations on the highlights of the programs, after which we're prepared to respond to your questions. Our first presenter is Val Hunt, who will discuss the advanced automation program.

Mr. HUNT. Thank you, Mr. Albrecht. Is this thing operating.

Mr. GLICKMAN. Just talk kind of close into it, if possible.

Mr. Hunt. Most of the members of the committee have heard most of the items in this briefing a number of times and I apologize, as repetition is boring; however, nothing much has changed in the way the program has been laid out. So, the first chart shows the strategy we adopted for the development of the new host computer. Award two contracts for design demonstration and full evaluation tests at the Technical Center in Atlantic City using a modern instruction compatible computer, and then, based on management costs and technical proposals, select one of those two contractors for a full-system-acquisition contract and the duration of the design competition contracts was estimated to be 21 months and the acquisition contract about 3 years.

The scope of work for the acquisition contract is to provide operational systems at the 20 en route centers, 1 for the Tech Center, 1 for the Aeronautical Center, and the advanced automation system contractors also need 1 computer each, for a total of 24. And to rehost the NAS software with the absolute minimum number of changes, we must maintain the standard 360/370 instruction interface in the hardware, provide a system support facility at the Technical Center, provide a training system at the Academy, provide logistics support and documentation.

I'm happy to report that the contracts for the design competiton phase were awarded on the 22d of September 1983, and all of these milestones listed here were completed as originally scheduled. No deviation whatsoever from our original program plan. I won't bore you by reading them individually, but we're at the point, on the next chart, where the acquisition-phase proposals have now been received. They were delayed 2 weeks at the request of one of the two contractors and the Government decided it was in the best interest of a fair competition to grant that 2-week delay.

The proposal evaluation is now underway and we plan to award the acquisition phase contract in mid-July of this year. In addition, we have now awarded construction contracts for at least three centers, possibly some more in the last week or two.

OK, looking now at the advanced automation system, the scope of work there is to perform a clean-sheet design of a new system, to meet the requirements of the 1990's and beyond, and to include both en route and terminal functions in one system. The principal products of that effort would be new sector suites, a new computing network, and totally new software. We would have to provide a phase transition from the new host computers operating on the old software to the totally new system, and of course we have to fully integrate with all of the other NAS-plan facilities.

The next chart, Bill. Provides documentation, training, and a logistics support program, contractor maintenance, initially, for both hardware and software, once again, systems for all area control facilities and the scope of work for the contractor is installation, site adaptation, and preparation for full ATC operations at each system—excuse me, at each site, prior to acceptance by the Government.

The next chart, Bill. Let's see; the one we want is the one that has the milestones on it. No. 15. That's it.

Now, the two design-competition-phase contracts were awarded in August 1984. The primes have finalized all of their subcontracts.

They have completed a cost-schedule reporting system in accordance with DOD instruction 7000.2. We have now received over 100 documents on schedule from each contractor and the first significant milestone was completed in early March, begun in February, and that's the system requirements review.

And the next forthcoming milestones are a system design review, looking at that for August of this year, demonstration of the sector suite mockups, also in August. A preliminary design review in September and that's for the sector suite, the inital sector suite system and for the full system in February 1986.

Looking now at the relationship my program has established with the SEI contractor, they have established a segment dedicated to my program. They have provided computer center capabilities and the program management information system was transferred on Monday of this week and is now in full operation on their computer center. They are expecting staffing for my segment to be completed by April and the Martin-Marietta manager of the segment dedicated to my program has been made a member of our program management board to integrate him into the management of the contracts. And, of course, they are actively participating in monitoring both the host and the advanced automation system primes.

So, in summary, Mr. Chairman, both the host and the advanced automation system projects are progressing on schedule and within budget. The SEI contractor is on board and performing very well. Currently planned funding is adequate, but any funding stretchouts will inevitably cause project delay. That completes my formal remarks. Do you want to handle questions now or later?

Mr. GLICKMAN. I'd suggest you go through all of what you're going to do.

Mr. ALBRECHT. Yes, sir. Fine.

Mr. HUNT. Thank you, sir.

Mr. ALBRECHT. In that case Neal Blake is our next presenter, who will cover the safety and weather programs.

Mr. BLAKE. Thank you, Al. And good afternoon, Mr. Chairman and members of this subcommittee. This year we are completing a number of R&D activities that were initiated in the early 1980's that support rulemaking activities in the fiscal year 1983 to 1985 time period. And today I'll report on some of the fiscal year 1986 R&D activities and address some of the changes in the program emphasis that we foresee over the next several years.

In the aircraft systems and fire safety area our emphasis over the next several years will be in the detection and suppression of in-flight fires and investigation of the fire characteristics of composites. We'll continue work on transferring technology we develop for the large aircraft to general aviation commuters and helicopters.

Our fiscal year 1986 program consists of concluding the anlaysis of the CID data, which includes in the case of the fire program, the performance of AMK. In the cabin fire safety area we're continuing to develop improved fire test methods and criteria for interior materials. We're continuing and starting really a major new start in the suppression extinguishment of in-flight fires, the comparison of several types of onboard and exterior firefighting systems, including sprinklers and penetrator nozzles and we will be starting our activity to determine the burns for resistance of composite materials.

In the engine and fuel safety areas, we continue to put emphasis on improving engine fuel systems safety and reliability. And also to continue to look into the area developing crash-safe fuel systems, including both the fuel itself and crashproofing the fuel system.

In fiscal year 1986, we're continuing our activity to evaluate the causes of engine damage due to foreign objects, particularly bird strikes, to determine the failure modes and see what changes we might want to make in our regulations on engine certification. We're also looking at some piston engine problems that relate to nacelle cooling.

In the flight safety area we're continuing our effort on environmental characterization. We have a council made up of five agencies, National Science Foundation, NASA, National Weather Service, Department of Defense, and ourselves, to determine ways of improving our ability to forecast icing conditions and to find less expensive ways to certify aircraft and helicopters for flight in those conditions.

In the icing program, in fiscal year 1986, we're extending the atmospheric environment characterization data base from a national data base to include data on a worldwide basis. And we are also investigating the use of simulation facilities in a certification process to reduce the cost to industry of bringing new products on line.

In the lightning area, we are continuing to take data cloud to cloud, but this year the focus will be on cloud-to-ground lightning and its effect on aircraft structures and digital systems onboard with a view toward looking at our standards in that area.

In the helicopter area; we're continuing to define the desirable helicopter-handling capabilities for low-speed approach and missed approach applications.

In the crashworthiness area we'll be focusing some of our future activity on determining the performance characteristics of advanced composites when used both in primary and secondary aircraft structures. We'll also be looking a transferring transport technology to commuter GA and helicopters and continuing our work on fuel system protection.

In fiscal year 1986, we will start the program to determine composite structure response to impact forces. We'll be modifying our analytical techniques now from all-metal-type structures to composite structures and these techniques are used to predict the performance of sea restraint and aircraft structures in a crash-impact situation. We'll be combining our seat and airframe models and we will start the development of a commuter aircraft analytical model.

In the aviation security area we're continuing our research efforts to develop advanced explosive detection systems to improve our concourse security systems and to find the best way of handling bombs discovered after the aircraft is in flight.

We plan to test an advanced thermal neutron detection system that does not contain the radioactive source which has somewhat limited the use of the current one and continue development and testing of advanced vapor detection systems.

In the regulatory area we have a whole series of regulatory outputs over the last several years. The bottom two, fire-blocking layers and cabin emergency lights have both gone to final rules as of October of last year.

Looking on now to our future regulatory actions, we will have a number of rules coming out this year and a number of notices of proposed rulemaking. One of——

Mr. GLICKMAN. Is that in our package you've given us? This list right here?

Mr. ALBRECHT. I believe so, it can be. If not, it will be. I think you have all the Vu-Graphs, you should have.

Mr. GLICKMAN. OK.

Mr. BLAKE. Some of the significant ones are cargo compartments, a change of liners, excuse me, the GA and transport seat strength ones, we're holding one, the antimist and kerosene one pending a full analysis of the said data, interior materials, which includes both criteria for testing and for selection of new materials. And that concludes the aircraft safety overview.

In the aviation weather area, looking first at near-term improvements, we're pleased to report that the leased service A computer terminals have been installed at all center weather service units and flight service stations. That the radar remote weather display system has been installed at 64 FAA locations and provides information from 134 radars. These systems are all in and shortly all will be operating.

We are also completing, in this calendar year, the installation of GOES, the satellite environmental receivers at the same 64 locations. These locations are the center weather service units and the flight service stations, which provide en route flight advisory service.

Our current programs are shown here. I'll touch briefly on each of them. In addition to the ones that we have listed here, we are working on a cooperative program with NASA Langley on the development of an airborne Doppler weather radar, trying to see whether we can in fact improve the performance of such radars to the point where we can detect microbursts on approach. It's a very difficult technical problem. We're continuing the reduction of the JAWS data, which has been taking place over the last several years and passing that information directly to industry. And we're continuing some wind shear precursor studies at the University of Illinois.

Next. At the low level wind shear alerting system, we plan to complete all installations in 1985 and 1986 for a total of 110 systems. In parallel with installing the basic system we have been looking at a much expanded system, which has been in operation at the New Orleans, Moisant Airport since June of last year, and we are installing an expanded system in Denver Stapleton Airport, which will become operational in May of this year. We're adding additional wind sensors, processing and display equipment. In addition we have requested funds for the upgrading of all 110 locations to the expanded capability and this request is in our F&E budget for fiscal year 1986. This effort is heavily supported by Dr. McCarthy and others at the National Center for Atmospheric Research. They have been developing for us improved methods of displaying the data and developing algorithms, which would clearly identify when a microburst condition existed within the airport area and to display that in a manner that could be easily transmitted to the pilot.

In the AWOS program we have now solved all of the problems that we had in the past with sensors and we are able to report wind speed direction, temperature dew point, altimeter setting visibility at cloud height and precipitation and are proceeding now on an 8(a) contract which will produce 200 systems. And we expect the production of the first system to start in July of this year. We will have systems starting to be developed—delivered, rather, in April of 1987 and the final system in March of 1989. In addition we plan to start a second procurement in 1988 for additional systems.

Supporting this effort are four sensor development efforts. As these are developed they will be added to the basic AWOS system to improve its capability and these are all things that have been requested of us by the user community. They include a prevailing visibility sensor, a single sensor for thunderstorm detection and reporting, a present weather sensor, ours being a simple one and the National Weather Service is also doing development work on a much more elegant one. If this comes along in time we'll also be looking at that and lastly a freezing rain detector.

The next generation weather radar program has attracted a lot of interest. We are currently funded through the end of the system validation phase and we will have two prototype systems, we being the triumvirate of Weather Service, Defense, and ourselves, in 1986, for test. We currently have no approval to proceed with implementation.

Next. In the terminal area, we have established at the Memphis Airport a fairly large test bed. It consists of one radar, which we believe closely approximates what we would like to see in a terminal Doppler weather radar. This radar and the processing equipment that goes with it has been developed by MIT's Lincoln Laboratory. We also have a very large and well-developed set of ground sensors and mesonet sensors and we have, on a University of North Dakota aircraft, an Enterprise radar, which we will be testing at the same time. The purpose of the test bed is to set the final technical requirements for the terminal radar, determine the best sighting, also to evaluate scanning strategies, types of displays and also to test and evaluate automatic algorithms, which convert the raw information from the radar into usable products for the controller and meteorologist. Testing at Memphis will be completed in December of 1985, at which time we will relocate the radar to Huntsville. It then becomes a part of a joint program with the National Science Foundation and the University of Chicago. It's called MIST for microburst and severe thunderstorm experiment. We will also have one—plan to have one of our own ASR-9 radars there, which as a weather channel and we will be able to determine what levels of weather we can detect with the airport surveillance radar, as we will have a number of radars, our own and National Science Foundation radars, at that location and the primary purpose, in addition to testing our equipment, is to investigate the microburst activity in the Southeast United States and this was something that was highly recommended to us by the National Ac[illegible]my of Science.

In the—with regard to the central weather proc[illegible] this is the system which accepts all of the radar and other [illegible]ts and converts them from their raw form into usable prod[illegible] for the meteorologist and then supplies that information to t[illegible] controllers for display in a very much processed form and also [illegible] the pilots. Our status here is that we have now a signed agreement with JPL for the development of that system. We except the first prototype to reach the technical center in January 1989 and we're planning implementation of 26 systems in the early 1990's.

There are several weather related programs. The weather communications processor is a device that we will be putting together, which will permit interfacing the outputs from the flight service station data processor and the central weather processor, with mode S data link system and of course through the mode S data link system directly to the cockpit to allow the pilot to access any weather that we have on the ground, both alphanumerical and graphic format in the cockpit.

We are still developing with National Weather Service aviation route forecasts. These are route oriented pilot weather briefings and that activity is continuing. It would become an enhancement to the flight service automation program when completed.

Two other efforts that are worth mention, the National Weather Service is continuing with a program to buy upper air wind profilers, we believe this program is extremely important in giving us more accurate observation of winds aloft. In addition we have set up, under Dr. McCarthy of NCAR, a group of technical experts that are addressing the question of improving forecasting, particularly short-term forecasting of icing, turbulence, winds aloft and severe storm generation and movement. And that committee has started to meet last fall and will be working through this year and next and that's a brief overview of the weather program.

Mr. **Glickman**. Thank you.

Mr. **Albrecht**. Finally, Mr. Chairman, Frank Frisbie will summarize the overall current R&D Program.

Mr. **Frisbie**. Thank you, Al. Just a few words about some of these programs, Mr. Chairman. The traffic collision avoidance system, TCAS, this is the airborne device which provides an aircraft separation insurance backup to the normal air traffic control operations. In the past we've completed the design guidelines for the TCAS-1, took delivery of the engineering model of the TCAS-2, had the minimum operational performance standards for minimum TCAS-2 from RTCA completed and a national standard for the minimum TCAS-2. Recently we made contract awards for TCAS operational deployment, the so-called LIP Program in September and November of 1984. We're looking forward to mimimum operational performance standards for the enhanced TCAS-2 from RTCA December of this year and a national standard for that device in December, and we're hopeful that we can bet those dates and we expect to complete the TCAS operational deployment in February of 1988.

Voice switching and control systems, VSCS, this is the device which will provide flexible communication operations necessary to complement the sector suite flexibility in our air route traffic control centers and area control facilities. That specification was completed in March 1984. We just issued the request for proposals for dual competition in February, looking forward to a contract award for that device in February 1986, critical design review, January 1987, production contract award in January 1989 and the first site operational in April 1990.

The flight service automation Service, FSAS—our objective is to develop an automated flight service station to replace the existing manual flight service station operations. The contract for Model one and Model two FSAS was awarded to E-systems in 1981. We've taken delivery at the FAA technical center of the first of the model one equipments in 1984. We expect the first operational site delivery of Model one in May 1985 and a first flight service data processing system and a flight service automation system site to be operational in December 1985. With respect to the contract award for the model two enhancements, package one and package two, those—the future of those is related to the outcome of the privitization studies that we talked about yesterday.

In the navigation area, the joint preliminary Department of Defense, Department of Transportation recommendation for future radio navigation system was completed in November 1984. We expect a final national standard for Loran-C in October 1986, a draft national standard for the navstar GPS satellite system use in September 1985 and we expect that the DOD/DOT, the final recommendations for the U.S. provided radio navigations system mix will be available in September 1987.

Microwave landing system, this is the development and implementation of a new common civil-military approach and landing system to meet the full range of user operational requirements well into the future. The committee has been following this with interest for some time. You'll recognize that ICAO approved the angle standards and recommended practices in fiscal year 1981, the TSO for avionics was issued in fiscal year 1982, the All Weather Operations Panel gave us approval for the distance measuring equipment, the precision distance measuring equipment in fiscal year 1983. We had approval to go to production in fiscal year 1983 and awarded a contract to Hazeltine Corp. in fiscal year 1984. We're now anticipating that the first production delivery from that contract will be in September 1986, that's later than we expected last year, some 9 months later, and the first system operational readiness state will be in October 1986. On the R&D side we've taken delivery of 20 micro-processor receivers and we expect to complete the evaluation reports for the service test and evaluation program in June 1985.

The MODE S/Data link—this is the improved surveillance and communication capabilities required to meet the needs of automated air traffic control. The specific goals of the program are to overcome the surveillance limitations of the present radar beacon system, provide an integral two-way data link. It's an evolutionary transition from the present secondary surveillance radar system or ATCRBS, in that program we issued a procurement request in 1983 for the ground equipment. We awarded a contract in October 1984. We expect the first delivery at our test set in fiscal year 1987 and the first operational site delivery in 1988. With respect to the communications link, the draft national standard was produced in June 1983. We're looking forward to ICAO standards to be approved in early 1987 and a national standard in April 1987.

The automated enroute air traffic control, the AERA, the software capability which will add to the air traffic control computers—here we're using higher levels of automation to improve safety and efficiency, to allow pilots to select more fuel efficient routes, to assist controllers in providing conflict free clearances and to monitor real time air traffic control operation for potential hazards and overloads. The initial AERA will provide planning aids to the controllers and we've listed some of those. Later capabilities will provide traffic management aids and we've listed some of those. The status is that the AERA-1 specification has been completed. We expect to complete the AERA-2 specification in December of 1985 and we expect that with the first AAS delivery we will include AERA software in 1991.

Thank you, Mr. Chairman.

Mr. GLICKMAN. Thank you. Why don't we get the lights here. Does that conclude your formal testimony?

Mr. ALBRECHT. Yes, Mr. Chairman.

Mr. GLICKMAN. OK, thank you very much. I would just ask you a couple of questions, a few questions.

Mr. Hunt, I am very concerned about the issue of computer security in this country and the integrity of the protection of our computers. This subcommittee has held hearings on that starting when we had one of these hackers in from Milwaukee to a variety of issues. Are you plugging into your air traffic modernization system an array of protections to preserve the integrity of the hardware and software so it's not capable of either being directly negatively affected or either through negligence? What I'm really trying to say is, are you protecting your computers as you design them? You need the mike. And what specifically are you doing with the large computer acquisition to protect those computers? That is, my feeling is that computer security has not had a very high level of interest in this Government, and it is obvious that one could wreck havoc with the air traffic control system in this country if one wanted to do it, or was so inclined, and the system we're designing is going to have less of a human element than the previous system and therefore, I think you'd better make sure that that's a component of the system.

Mr. HUNT. Yes, sir. The host computer system will pretty much use the same software that's in place today. And so there will be no changes with respect to its immunity from unauthorized penetration. However, I would point out——

Mr. GLICKMAN. Is that immunity any good? The current immunity?

Mr. HUNT. I would point out, sir, that the current systems are not interconnected to the public telephone system in any way and that's the usual method used for penetration by the so-called hackers.

Mr. GLICKMAN. Well, what about insiders? That is, our subcommittee has found, that the greatest threat to computer systems in this country are by people who have access to them.

Mr. Hunt. Insofar as I know, having looked at the issue of computer security a great deal——

Mr. Glickman. I'm sorry, authorized access.

Mr. Hunt [continuing]. Oh, having looked at this issue a great deal in the days before I joined the FAA, there is no protection against people. One must have people authorized to maintain the software in the system, the so-called system analyst and you have to trust those people, but aside from that I believe that the FAA has quite good physical protection in place.

Mr. Glickman. Do you train your people on computer security? Do you train your people on how to protect the information base? Not just how to use it, but how to insure its integrity either from outside disasters, outside sources or internally?

Mr. Hunt. I can't speak to the training, perhaps one of the other folks could speak to that in a moment, but let me address the issue of protecting the integrity of the information. There are a number of ways in which computer, modern computer technology can protect information. By properly partitioning the data base, by having access authorization codes at a number of levels in the data bases and in the programs themselves. These practices will all be followed with the automation—excuse me, the advanced automation system design.

Mr. Glickman. OK, I guess my point is we're talking about building the largest nondefense computer system ever built by this Government, nearly $11 billion, bigger than the social security system, the VA, and lots of other items. My experience with the Federal system is that the protection of computers and the information stored therein has a very low priority in this Government and I'm just telling you that from this subcommittee's point of view, my own personal point of view, I don't—I've been here now for 5 years, I've never heard the subject of computer security mentioned once. I've heard about our building big computers and big—and modern software and everything else and by that I mean computer integrity as well as computer security. And issues not just related to terrorism or criminal activity, but natural disasters, which may affect the computer system and how you're going to operate from that. I'd just, at some point, like to know that you're focusing on that. Maybe Mr. Albrecht wants to comment.

Mr. Albrecht. Well, Mr. Chairman, we share your concern. I think both Val and I have had our nose rubbed in that problem in previous incarnations and I think we understand the seriousness of the problem. This is a matter of judgment. Certainly new software will do everything that's reasonable to protect that software from even internal tampering. As Val said, nothing is absolutely foolproof, but I think we need to exercise the right kind of judgment on how far you go and we will address that issue. If you carry it a little further yo can talk about physical security and then you get carried away and you talk about hardening all the telephone lines and pretty soon you've spent the national budget, so someplace you have to decide what's a reasonable amount of effort to put in. We accept your comment. We agree with it. I think it's something we need to consider, and you're right, up to now there's been very little visible work in terms of extra facility——

Mr. GLICKMAN. You know, it's the idea of spending all this money and then not taking elementary precautions. I would—maybe you're not aware of this, we held a hearing last June on this subject and one of the folks from one of our national laboratories came in and that laboratory had been invaded, granted there was telephone access into the lines, and the password utilized by the national laboratory was the same password used by the computer in the movie "Wargames," and in fact the password hadn't been changed for a long period of time. Now, what apparently happened in that case was nobody was sensitive to the problem there. That doesn't take spending any money to change a password.

Mr. ALBRECHT. True. I think we appreciate you sensitizing us. I think we certainly will address that problem. If you want to check computer security you might try to get yourself into the parallel evaluations being run by IBM and their competitor at the Tech Center. There's no way you're going to get inside that door. And there are things you can do, which we're aware of.

Mr. GLICKMAN. OK, I just wanted to ask you to look into that.

Mr. ALBRECHT. Yes, sir.

Mr. GLICKMAN. The—let me ask a question about TCAS. I forgot who was talking about TCAS. I think that you were.

Mr. FRISBIE. Yes.

Mr. GLICKMAN. And yesterday it was brought to our attention that TCAS has been put on hold, the collision avoidance system, I think the Airline Pilots Association brought that to our attention, said that the whole concept of collision avoidance systems between airplanes, which was a high priority of the FAA, has slipped considerably and I wonder if you might comment on that.

Mr. FRISBIE. Yes, Mr. Chairman. I'm not sure that—I think it was Captain Howell talked about that—that he was fully aware of what we're doing in TCAS and indeed it has not been put on hold and it has not slipped. He spoke, I think, of an impass and what we're doing is that together with Piedmont Airlines, Piedmont Airlines is working to get FAA certification to carry TCAS equipment in—on a commercial aircraft in routine operation flight. In that process they're dealing with one of our certification offices. That certification office is constructively criticizing the proposal that Piedmont has made and they have gone back and forth several times, but this is the first time that this has been done. I think there is good will on both sides and we fully expect that installation will be certified and that Piedmont will move ahead. I also spoke about the fact that we had awarded the contracts for the LIP program that we have in mind to complete the minimum operational performance standards for the enhanced TCAS-2 and the national standard for those. I think, Mr. Chairman, if Captain Hal had heard what we had to say today, perhaps he would not have made that comment yesterday.

Mr. GLICKMAN. Well, then you're saying there's no slippage on TCAS?

Mr. FRISBIE. I'm saying that we're going through the normal process of certification, breaking ground for the first time. It's not a process over which we have unilateral control. It has not gone without a hitch, but those hitches are, I believe, constructive because they're pointing out areas in which, for the benefit of all concerned that improvements or more data needed to be supplied.

Mr. **Albrecht**. Mr. Chairman, to put TCAS in context, the R&D is done and we can declare that a success. FCAS-1, TCAS-2 and TCAS-2(a) enhancements, it works, we're in the middle of, if you will, operational evaluation phase, which seemed be desirable. On the other hand we're developing specs, MOPS, have developed most of them, as Frank talked about on his slides, so if anyone wanted to go ahead and build one they could. On the other hand we're trying to give the program support until that happens.

Mr. **Glickman**. OK, again I'd point out that one of the first things I did when I came on this subcommittee years ago was to deal with the collision avoidance questions. That's really the issue behind the whole NAS plan, I mean to accommodate an increasing number of airplanes so that they don't run into each other, and I would hate to see us—I mean I don't want to put something into effect that doesn't work, but you're saying the R&D is done. I would hate to see us unnecessarily slip in that area and find ourselves hit by an accident or something and all look very embarrassed in the process. So you think that the things on track?

Mr. **Frisbie**. We think we are continuing to make progress, Mr. Chairman. As I said the work that is being done between Piedmont and the certification office I think is all to the good and the net result will be a better product. We don't see it as a long delay. The process is being worked at actively and we expect that they will have that approval very soon.

Mr. **Glickman**. OK, I'm just going to ask one more question, but Mr. Hunt, I'm going to have—there are a variety of questions which I would like to have the FAA answer for the record that I don't have time for. They're mostly technical questions and what we'll do is we're going to send you a letter. I think most of these questions, to the extent that they're relevant, and if they don't get answered today by any of my other colleagues I'd like to send to you.

I would like to ask a little bit about weather radar and close on those questions. We talked a little bit about the Nexrad program and I get a feeling that Nexrad is on hold a bit and I wonder if you might talk about that and also talk about what's the acquisition, installation plan for the airport service detection radar and generally talk about the issues of the whole terminal versus the en route issue in terms of weather radar?

Mr. **Albrecht**. Mr. Chairman, let's take Nexrad, internal Nexrad first and Neal Blake is anxious to address that issue, after which Mr. Pozesky can talk about the ASDR Program.

Mr. **Blake**. Thank you, Mr. Chairman. We have been proceeding on the original schedule so far as the Nexrad R&D activity is concerned. We did have our F&E funding put on hold by OMB and this is partially to await the results of a commercialization study that the Department of Commerce is conducting. Assuming the results come out as we expect and we have good support for implementation of the next generation Nexrad radar, we see about 1-year delay in the program as a result of that action.

On the terminal Doppler weather radar area we have proceeded with our R&D program with the full support of OMB. We have established a test bed at Memphis and will be getting all of the data from that test bed that we expected to get. Continuing the activity the following year down in Huntsville and I think we will pretty much have, not only the information needed to develop equipment, but also the data base on microbursts in a part of the country that the Academy thought we should study. At the present time we do not have approval to proceed with implementation of that radar.

Mr. **Glickman**. I'm sorry, you do not have approval. Approval by whom?

Mr. **Blake**. From the Office of Management and Budget to put that item in our budget.

Mr. **Glickman**. That concerns me because with the attention to major accidents due to wind shear microbursts, I would think that would be a real high-priority issue for you.

Mr. **Albrecht**. Well, part of that issue, Mr. Chairman, has to do with the question whether or not a simple off-the-shelf radar will solve the problem. If that answer should turn out to be right then everybody saves a lot of money and perhaps a little bit of time. In our view, we've looked at the candidates, we evaluated them and we know of no solution other than Nexrad for the kind of problem we're trying to solve, as the Administrator said yesterday. So, we feel we can anticipate the results of that study.

Mr. **Glickman**. OK, but in terms of the terminal Doppler weather radar, is that subject to the same hold as the Nexrad is?

Mr. **Blake**. Well, our plan had been to build a derivative of the Nexrad radar and use that in the terminal. We had a study of our terminal area requirements and available equipment conducted by Martin-Marietta. I think they reached the same conclusion that we'd reached previously, that the commercially available equipment did not meet our full requirements, not is it likely that they could be upgraded to fully meet these requirements. We believe, in the case of the Nexrad Program, we worked for several years with the Air Force Weather Service and National Weather Service and we did come up with a joint specification that met both their forecast needs and severe weather warning needs and our needs for short-term weather radar information. As real time information to keep the pilots out of the severe weather.

Now, some of the differences that we see between commercially available radars and the ones that we feel that we need is a lack of sensitivity to some of the harder to detect phenomena, particularly the microburst, failure to provide circuitry to remove ground clutter, which pretty much obscures the weather information in the first 10 to 15 miles around the radar, which quite typically is in the terminal area and is the area of greatest interest. Also, in looking at what the commercial market had to offer we failed to find much in the way of processing. The systems that are available provide essentially raw radar displays of intensity and Doppler spread. None of them provide you with the type of information we would need. Processed information that would clearly identify the weather hazard to the meteorologist, controller, and the pilot.

Mr. **Glickman**. OK, well I'm going to—it will be my last question. I don't know how you're going to come off if it, but I would tell you that from the standpoint of protecting the public, I think, that the terminal radar issue seems to be of higher priority, because that's where the effects of microbursts are most critical, but I would suggest that you keep us informed here so that we may be able to work with the Office of Management and Budget. If the facts are absolutely clear then people's lives are being jeopardized down the road if these things don't come down on line.

Mr. ALBRECHT. We'll keep you fully informed, Mr. Chairman.

Mr. GLICKMAN. Yes, OK. Thank you very much. Mr. Lewis.

Mr. LEWIS. Thank you, Mr. Chairman.

Mr. Albrecht, what is the status of the ultralight ruling process at this point? All these little things buzzing around.

Mr. ALBRECHT. Mr. Lewis, the FAA held public hearings on ultralights in September of last year in Washington, Chicago, Los Angeles, and Fort Worth, now based in part on these hearings the FAA drafted a policy on how to deal with ultralights and that draft policy is now under review with the Department. That being the case it's a little premature to comment on the content while it's still under review. Let me hasten to add, that's really the purview of the Associate for Aviation Standards, who we normally don't bring to these hearings because his involvement in the R&D budget is very light, but if you'd like additional information beyond what I've given you we would be very glad to provide it for the record.

Mr. LEWIS. OK. I would like to know.

Mr. ALBRECHT. All right.

Mr. LEWIS. Where are you with regards to the rulemaking in the areas of cabin interior and fire blocking materials, seat strength, and cargo liners?

Mr. BLAKE. As I showed on the VuGraph, all of these rules making actions either have been taken or will be taken this year, so we're very far along on those.

Mr. LEWIS. So, you're saying that by the end of 1985 you will have it all done?

Mr. BLAKE. Yes, sir, we will have all of our technical packages out by the end of 1985. We do have to go through approval process in the Office of the Secretary and OMB before we can actually issue the final rule. This is generally not a lengthy process.

Mr. LEWIS. I see. OK, that's all the questions I have, Mr. Chairman. I have another rollcall I have to meet.

Mr. GORDON. Mr. Packard.

Mr. PACKARD. Thank you, Mr. Chairman. In designing your computer systems, do you or have you taken into consideration the concern that seems to be in existence now regarding duplication with other departments and other governmental operations, no central data base and yet a move to consider perhaps contralizing our entire Government data base collection system, is your system, which is going to be a rather major investment, is it designed so that it can accommodate a move in this direction in the Government?

Mr. ALBRECHT. Mr. Packard, I think we need to separate the variablies a little bit. Within the Government there are two distinct kinds of processing requirements. One is for administrative traffic, the payroll personnel things, an awful lot of traffic that goes through and the other is for an operational need. We're an operational outfit, so we try very hard not to mix those two so that one can't affect the other. In terms of are there other standard devices that we can buy off the shelf that will do the job that the host or the advanced automation system is intended to do, we looked at that very, very hard, as you know we have some oversight from Congress in terms of trying to buy standard things and I think we have a well documented position that says for the air traffic control application that's just not practical. Now Val, would you like to add to that?

Mr. **Hunt**. I think that's an excellent answer.

Mr. **Packard**. In other words you have evaluated your systems and tried—and made an effort to determine if there are other governmental operations that could profit or be coordinated with your operative systems and——

Mr. **Albrecht**. Yes, sir.

Mr. **Packard**. OK. In the letting of your contracts, what type of bid arrangements do you have? How do you normally—are all you—all your construction programs put out to bid?

Mr. **Frisbie**. I think the answer to the last part of that question is "No," Mr. Packard. We use the full range of contracting vehicles that are available within the Federal Acquisition Regulations. With respect to the latter part of the question, construction, which as you recognize is only a part of our business. We put out electronics and many other things for competitive and noncompetitive awards. In the noncompetitive award category, we participate with the Small Business Administration, under the Small Business Act and let a number of contracts under section 8(a) of that act, which is set aside for small and disadvantaged businesses.

Mr. **Packard**. And on change orders, how do you monitor your change orders and—well primarily your change orders, do you have a monitoring system?

Mr. **Frisbie**. Yes, sir, we have a full contract administration capability within FAA. It's outside of our purview. We make a conscious division between the engineering offices, the sponsors, if you will, and the contracting side, whose job it is to make sure that oversight is provided. And on the contracting side of FAA there is strict control of all of the documentation required in contracting.

Mr. **Packard**. And if perchance, change orders and for other reasons the contract is going to exceed budget, what procedure do you normally follow?

Mr. **Frisbie**. Depending upon the level of the change, it can require the Administrator's approval of perhaps sometimes, if the amount of money is large enough, we would require a reprogramming action that would have to come before the Congress.

Mr. **Packard**. OK, thank you very much.

Mr. **Gordon**. Do any other panelists have any thoughts, suggestions or comments?

Mr. **Albrecht**. None additional, Mr. Gordon. I'm sure we could stay here all day and answer questions and we'd be very glad to supply, if you want to keep the record open, any afterthoughts or any others you might have for the record.

Mr. **Gordon**. Well, thank you for your time. This meeting will be adjourned subject to the call of the chairman.

[The charts follow:]

ADVANCED AUTOMATION PROGRAM

MARCH 20, 1985

SELECTED APPROACH

- TO REALIZE EARLY GAINS AND REDUCE OVERALL PROGRAM RISK, ADOPT A PHASED INTRODUCTION OF NEW SYSTEMS ELEMENTS INTO OPERATIONAL SITES:
  - FIRST, INSTALL NEW HOST COMPUTER, USING OLD NAS SOFTWARE
  - SECOND, INTRODUCE NEW SECTOR SUITE, USING HOST COMPUTER, NAS SOFTWARE, WITH SOME NEW SOFTWARE
  - THIRD, INTRODUCE THE REMAINING NEW SYSTEM ELEMENTS, INCLUDING NEW SOFTWARE
  - TO PERMIT THE SYSTEM TO STABILIZE, ALLOW TWO YEARS BETWEEN EACH OF THESE THREE STEPS
- THIS APPROACH NOW AN INTEGRAL PART OF NAS PLAN

OBJECTIVES

- START OF INSTALLATION OF NEW COMPUTERS IN ENROUTE CENTERS BY 1986
- NEAR TERM ENROUTE FUNCTIONAL ENHANCEMENTS - 1986 - 1987
- NEW SECTOR SUITE OPERATION BEGINNING IN 1990
- HIGHER LEVELS OF ATC AUTOMATION AT AREA CONTROL FACILITIES BY 1992 (AERA-1) AND CONTINUING THROUGHOUT THE 1990'S (AERA-2 & -3)
- CONSOLIDATION OF TRACONS THROUGH AREA CONTROL FACILITIES CONCEPT

SELECTED PROCUREMENT STRATEGY

- TWO MAJOR PROCUREMENTS:
  - HOST
  - AAS

- BASED ON:
  - MAXIMUM PRACTICAL COMPETITION
  - PRUDENT RISK MANAGEMENT
  - HOST SELECTION CONSTRAINED BY COMPATIBLE INSTRUCTION SET REQUIREMENT
  - EARLY CAPACITY IMPROVEMENT THROUGH HOST STRATEGY
  - FULL COMPETITION FOR AAS

HOST PROCUREMENT STRATEGY

- COMPETITIVELY AWARD TWO CONTRACTS FOR DESIGN, DEMONSTRATION AND FULL EVALUATION TEST AT FAA TECHNICAL CENTER OF REHOSTED NAS SOFTWARE ON A MODERN INSTRUCTION - COMPATIBLE COMPUTER
- BASED ON TECHNICAL, MANAGEMENT AND COST PROPOSALS, SELECT ONE OF THE TWO DESIGN COMPETITION CONTRACTORS FOR FULL SYSTEM ACQUISITION
- DURATION OF DESIGN COMPETITION CONTRACTS - 21 MONTHS
- DURATION OF ACQUISITION CONTRACT - APPROXIMATELY THREE YEARS

HOST ACQUISITION SCOPE OF WORK

- PROVIDE OPERATIONAL SYSTEMS AT 20 ARTCC'S, 1 EACH FOR FAATC AND FAAAC, AND 1 EACH FOR AAS / DCP CONTRACTORS
- REHOST NAS SOFTWARE WITH ABSOLUTE MINIMUM NUMBER OF SOFTWARE CHANGES
- MAINTAIN STANDARD 360 / 370 INSTRUCTION SET HARDWARE / SOFTWARE INTERFACE
- PROVIDE SYSTEM SUPPORT FACILITY AT FAATC
- PROVIDE TRAINING SYSTEM AT FAA ACADEMY
- PROVIDE FULLY INTEGRATED LOGISTIC SUPPORT SYSTEM, INCLUDING DOCUMENTATION AND TRAINING

HOST SYSTEM ACCOMPLISHMENTS

- ALL MILESTONES COMPLETED ON SCHEDULE:
    - COMPETITIVE CONTRACTS AWARDED SEPT 22, 1983
    - DESIGN REVIEWS COMPLETED FEB 1984
    - COMPUTER INSTALLATIONS AT FAATC COMPLETED JUNE 1984
    - INSTALLATION / INTEGRATION TESTS COMPLETED OCT 1984
    - FORMAL DEMONSTRATION TESTS BEGAN OCT 22, 1984
    - FIRST SITE (SEATTLE) GROUND BREAKING NOV 5, 1984
    - DEMONSTRATION TESTS COMPLETED JAN 7, 1985

HOST SYSTEM ACCOMPLISHMENTS (CONT.)

- ACQUISITION PHASE PROPOSALS DELAYED TWO WEEKS, DELIVERED FEB 24, 1985
- PROPOSAL EVALUATION UNDERWAY
- PLANNED AWARD OF ACQUISITION PHASE CONTRACT MID - JULY 1985
- CONSTRUCTION CONTRACTS AWARDED FOR THREE CENTERS - SEATTLE, BOSTON AND HOUSTON

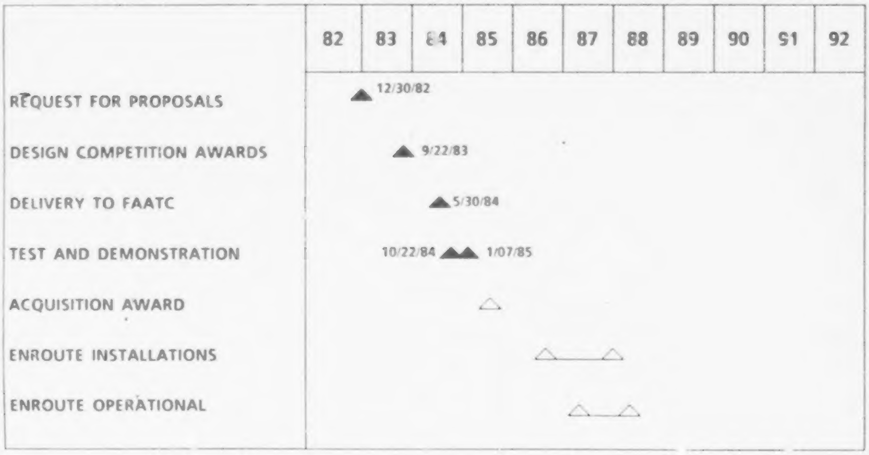
HOST CONSTRUCTION SCHEDULE

FIELD SITE	SITE NAME	BUILDING COMPLETION
1	SEATTLE	11/30/85
2	HOUSTON	12/30/85
3	DENVER	04/01/86
4	BOSTON	03/01/86
5	WASHINGTON	03/15/86
6	CHICAGO	04/06/86
7	OAKLAND	04/15/86
8	ALBUQUERQUE	04/01/86
9	MEMPHIS	05/15/86
10	CLEVELAND	06/01/86

HOST CONSTRUCTION SCHEDULE

FIELD SITE	SITE NAME	BUILDING COMPLETION
11	ATLANTA	06/01/86
12	MIAMI	07/01/86
13	LOS ANGELES	06/01/86
14	NEW YORK	08/01/86
15	KANSAS CITY	07/05/86
16	MINNEAPOLIS	07/05/86
17	INDIANAPOLIS	08/16/86
18	JACKSONVILLE	10/15/86
19	FT. WORTH	09/15/86
20	SALT LAKE CITY	03/20/87

HOST COMPUTER SYSTEM SCHEDULE



AAS PROCUREMENT STRATEGY

- COMPETITIVELY AWARD TWO CONTRACTS FOR SYSTEM DESIGN AND DEMONSTRATION OF SECTOR SUITE CONSOLE PROTOTYPES
- COMPETITIVE CONTRACTS WILL EXTEND THROUGH COMPLETION OF DESIGN, INCLUDING CRITICAL DESIGN REVIEW
- BASED ON FULL TECHNICAL, MANAGEMENT AND COST PROPOSALS, SELECT ONE OF THE TWO DESIGN COMPETITION CONTRACTORS FOR FULL SYSTEM ACQUISITION
- ESTIMATED DURATION OF DESIGN CONTRACTS - 3 YEARS
- ESTIMATED DURATION OF ACQUISITION CONTRACT - 6 YEARS

ADVANCED AUTOMATION SYSTEM (AAS) SCOPE OF WORK

- PERFORM A "CLEAN SHEET" DESIGN OF A NEW SYSTEM TO MEET THE REQUIREMENTS OF THE 1990'S. INCLUDE BOTH ENROUTE AND TERMINAL FUNCTIONS
- PROVIDE:
  - NEW SECTOR SUITES
  - NEW MODERN DISTRIBUTED COMPUTING NETWORK
  - NEW SOFTWARE
- PROVIDE A PHASED TRANSITION FROM THE REHOSTED NAS TO THE FULL AAS
- PROVIDE A SYSTEM SUPPORT FACILITY INTEGRATED WITH OTHER NASP FACILITIES

ADVANCED AUTOMATION SYSTEM (AAS) SCOPE OF WORK (CONT.)

- PROVIDE DOCUMENTATION, TRAINING AND AN INTEGRATED LOGISTICS SYSTEM PROGRAM
- PROVIDE THE FIRST YEAR OF CONTRACTOR MAINTENANCE AFTER OPERATIONAL DEPLOYMENT FOR BOTH HARDWARE AND SOFTWARE
- PROVIDE SYSTEMS FOR ALL AREA CONTROL FACILITIES
- PROVIDE INSTALLATION, SITE ADAPTATION, AND PREPARATION FOR FULL ATC SYSTEM OPERATION AT EACH SITE PRIOR TO ACCEPTANCE

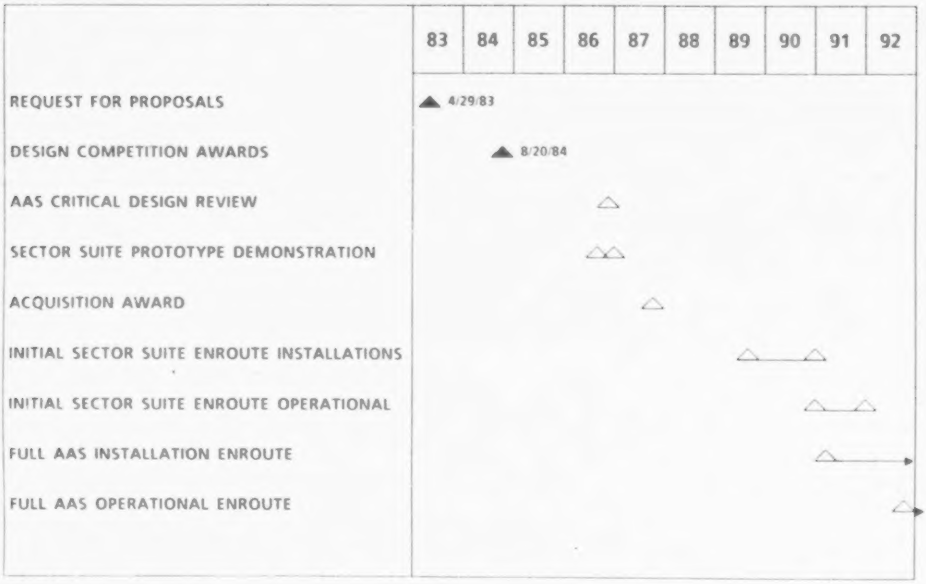
AAS ACCOMPLISHMENTS

- DCP CONTRACTS AWARDED AUG 84
- BOTH PRIMES HAVE FINALIZED SUBCONTRACTS
- DODI 7000.2 COST / SCHEDULE REPORTING SYSTEMS APROVED
- OVER 100 DOCUMENTS DELIVERED ON SCHEDULE BY EACH CONTRACTOR
- SYSTEM REQUIREMENTS REVIEWS WERE COMPLETED AS SCHEDULED IN LATE FEB / EARLY MARCH

NEXT KEY MILESTONES

- AAS SYSTEM DESIGN REVIEW AUG 85
- SECTOR SUITE MOCK-UP DEMOS AUG 85
- SECTOR SUITE PRELIMINARY DESIGN REVIEW SEPT 85
- AAS PRELIMINARY DESIGN REVIEW FEB 86

ADVANCED AUTOMATION SYSTEM SCHEDULE



SEI CONTRACTOR RELATIONSHIP

- CONTRACTOR HAS ESTABLISHED A SEGMENT DEDICATED TO THE THE ADVANCED AUTOMATION PROGRAM
- THE AAP PROGRAM MANAGEMENT INFORMATION SYSTEM HAS BEEN TRANSFERRED TO THE SEI COMPUTER CENTER
- STAFFING EXPECTED TO BE COMPLETE BY APRIL 85
- SEI / AAP MANAGER HAS BEEN MADE A MEMBER OF AAP'S PROGRAM MANAGEMENT BOARD
- SEI IS ACTIVELY PARTICIPATING IN MONITORING BOTH HOST AND AAS PRIME CONTRACTORS

SUMMARY

- BOTH HOST AND AAS PROJECTS ARE PROGRESSING ON SCHEDULE, AND WITHIN BUDGET
- THE SEI CONTRACTOR IS ON BOARD, AND PERFORMING VERY WELL
- CURRENTLY PLANNED FUNDING IS ADEQUATE BUT STRETCH-OUTS WILL CAUSE PROJECT DELAYS

FY-1986
Aviation Weather Overview

Near Term Improvements

- Leased Service A Installed at All Center Weather Service Units and Flight Service Stations
- Radar Remote Weather Display System (RRWDS)
  - Color Display of Six Levels of Weather Radar Data
  - 134 Radar Network (77 NWS Weather Radars and 57 FAA Long Range Radars)
    - 134 Digitizers Installed/132 Operational
  - 64 Operating Locations Equipped
    - 151 Display Systems Procured
    - 143 Installed and Operating
    - 8 Displays Used for System Support
- Geostationery Operational Environmental Satellites (GOES)
  - Provides Visual and Infrared Imagery
  - Operational at 20 CWSU's and 20 FSS's
  - 64 Operational Locations: December 1985

Current Programs

- Low Level Wind Shear Alert Systrem (LLWAS)
- Automated Weather Observing System (AWOS)
- Next Generation Weather Radar (NEXRAD)
- Memphis Weather Radar Support Facility
  - Huntsville Activity
  - Microburst and Severe Thunderstorm Experiment (Mist)
- Central Weather Processor (CWP)
- Related Programs

Low Level Wind Shear Alert System (LLWAS)

- Provides Low-Altitude Wind Shear Advisories to Airport Traffic Control Towers for Relay to Pilots
  - 110 Systems Funded
  - 59 Systems Operational
  - 51 Systems Scheduled for Installation in 1985/86
- Expanded LLWAS Installed at 2 Major Airports
  - New Orleans Moisant Airport — June 1984
  - Denver Stapleton Airport — May 1985
    - 5 Additional Wind Sensors
    - Improved Remote Siting
    - Modified Data Processing
    - Data Recording and Archiving
  - 110 Locations Programmed for Expanded LLWAS in FY-86 F&E
- National Center for Atmospheric Research
  - NCAR Investigations Improved Display Techniques
  - Studying Modified Siting Criteria
  - Developing Alternative Alerting and Display Algorithms

Automated Weather Observing System (AWOS)

- Willl Provide Efficient, Reliable, Cost-Effective Automated Weather Observations for Towered and Non-Towered Airports With Approved Instrument Flight Operations and for Selected Flight Service Stations
  - Initial Capability Provides: Wind Speed and Direction, Temperature, Dew Point, Altimeter Setting, Visibility, Cloud Height and Precipitation
  - Information Available Through Control Towers, FOR Voice Broadcast and Telephone Dial-Up
  - Will Become Integral Part of National Surface Observation Network
- 8A Contract for 200 Systems
  - Limited Production Starts : July 1985
  - First Production Unit Delivered : April 1987
  - Final FAA System Delivered : March 1989
- Competitive Procurement Planned: 1988

Improved Sensors

- FAA Limited Development Effort
  - Prevailing Visibility
  - Thunderstorm Detection System (Single Sensor)
  - Present Weather Sensor (NWS Directed Project)
  - Freezing Rain Detector

Next Generation Weather Radar (NEXRAD)

- Will Provide Nationwide Doppler Weather Radar Data to Center Weather Service Unit Meteorologists, Air Route Traffic Control Center Controllers, Flight Service Station Specialists, and Pilots
  - — Joint Development Effort With National Weather Service and USAF Air Weather Service
  - — NEXRAD Aviation Weather Products Include: Winds, Turbulence, Precipitation, Thunderstorm Detection and Tracking, Hail, Frontal Activity, Icing Conditions, Mesocyclone/Tornado Detection and Tracking
- Currently in System Validation Phase (Two Contractors) : Funded
- Prototype Production Began September 1984 : Funded

Memphis Weather Radar Support Facility

- Will Provide Active Airport Location for Developmental Testing, Data Acquisition, and Preliminary Operational Interface Evaluations for Terminal Configuration
  - — Primary Test Director: MIT's Lincoln Laboratory
  - — Evaluate On/Off Airport Siting Criteria and Guidelines for Terminal Applications
  - — Evaluate Scanning Strategies, Data Processing, and Display Techniques
  - — Test Site Established: June 1984
  - — Testing and Evaluation Completed: December 1985
- Huntsville, Alabama Project
  - — Radar Relocated to Huntsville: Winter 1986
  - — Comparison With Collocated ASR-9 Weather Channel
  - — Participate in Mist
    - National Science Foundation/University of Chicago Project
    - Investigate Microburst Activity in Humid Southeastern United States

Central Weather Processor (CWP)

- Will Provide to Each Area Control Facility (ARTCC) a Capability to Manage, Synthesize and Disseminate Weather Information Throughout the National Airspace System. Will Be focal Point for Aviation Weather Processing for CWSU Meteorologists, Air Traffic Controllers, FSS Specialists and Pilots.
  - System Capabilities Include: Radar Mosaicking, Satellite Image Overlay, Automatic and Interactive Manipulation of Weather Data, and Automated Data Dissemination
  - Currently in System Specification and Functional Requirements Development Stage
  - First Prototype to FAA Technical Center: January 1989
  - 26 Systems Planned With Field Implementation Between 1993-1994

Weather Related Programs

- Weather Communications Processor
- Mode S Data Link: Direct Access to Weather Data
- Flight Service Automation System
  - Aviation Route Forecasts (ARF): Route Oriented Pilot Weather Briefings

Aviation Weather

- Improved Upper Wind Measurements
- Improved Forecasting of Icing, Turbulence and Winds Aloft

FY 1986 Aircraft Safety Program

Aircraft Safety Program

- ***Aircraft Systems Fire Safety***
  - ***Program Areas***
    - Inflight Fire Hardening
    - Transfer Transport Technology to GA and Helicopters
    - Cost Effective/Efficient Test Procedures
    - Application of Advanced Technical Products
    - Fire Characteristics of Composites
  - ***FY 1986 Program***
    - AMK — Conclude CID Analysis
    - Cabin Fire Safety
      - Interior Materials Fire Test Methods and Criteria
      - Suppression/Extinguishment of Inflight Fires
      - Sprinkler Systems vs. Penetrator Nozzles
      - Burn Through Resistance of Composites

Aircraft Safety Program

- ***Engine/Fuel Safety***
  - Program Areas
    - Improve Engine/Fuel System Safety and Reliability
    - Crash-Safe Fuel Applications
      - AMK
      - Crash-Proof Fuel Systems
    - Operational Support
  - ***FY 1986 Program***
    - Evaluation of Engine Response to Bird Strikes
      - Determination of Failure Modes
    - Investigation of Nacelle Cooling Problems

Aircraft Safety Program

- ***Flight Safety***
  - ***Program Areas***
    - Environmental Characterization
    - Improved Methods for:
      - Aircraft Icing Certification
      - Certification of Advanced Avionics/Electrical Systems
    - Safety Improvements for Expanded Helicopter Operations
    - Cooperative Transfer to Civil Operations of Advanced Aerodynamic Research
  - ***FY 1986 Program***
    - Icing
      - Extend Atmospheric Environment Characterization Data Base to Include Worldwide Conditions
      - Use of Simulation Facilities in Certification
    - Lightning — EMI Effects of Digital Systems
      - Aircraft System Hardening
    - Helo — IFR Helo Handling Capabilities (Low Speed)
      - Helo Classification — Control Augmentation and Stability

Aircraft Safety Program

- ***Crashworthiness***
  - ***Program Areas***
    - Performance Characteristics of Advanced Composites
    - Transfer Transport Technology to Commuter, GA, and Helicopter
    - Fuel System Protection
  - ***FY 1986 Program***
    - Composite Structure Response to Impact Forces
    - Analytical Techniques for Predicting Composite Seat/Restraint System Performance
    - Combination of Seat and Airframe Models
    - Develop Commuter Aircraft Analytical Model

Aircraft Safety Program

- ***Aviation Security***
  - ***Program Thrusts***
    - Advanced Explosive Detection Systems
    - Enhanced Concourse Security Systems
    - Inflight Bomb Handling
  - ***FY 1986 Program***
    - Establish Feasibility of Using Additives for Enhanced Bomb Detection
    - Test Advanced Thermal Neutron Detection System
    - Continue Development and Testing of Advanced Vapor Detection Systems

Aircraft Safety Regulatory Actions

Regulatory Accomplishments

Tire/Wheels and Brakes	TSO-C26C/C62C	12/31/79
Flight Attendant Seats — Shoulder Harness Amendment	121-155	3/6/80
Fire Extinguishers	AC20-42B	8/25/82
Child Restraint	TSO-C100	5/28/82
Tire Maintenance	ACI 45-4	9/27/82
Deicing Procedures	AC20-117	12/17/82
Life Preservers	TSO-C13d	1/3/83
Aluminized Slides	TSO-669a	6/3/83
Crew Protective Breathing	TSO-C99	6/27/83
Fire Blocking Layers	Final Rule (25-59, 29-23, & 121-184)	10/26/84
Cabin Emergency Lights	Final Rule (25-28 & 121-183)	10/26/84

Aircraft Safety Regulatory Actions

Regulatory Plans

Cargo Compartments	Final Rule	12/31/85
Fire Extinguishers and Smoke Detectors	Final Rule	6/85
Crash Resistant Fuel Systems (G/A)	NPRM	Summer 85
Human Tolerances	Final Advisory Circular	6/85
G/A Shoulder Harness	NPRM	Summer 85
G/A and Transport Seat Strengths	NPRM	6/85
Crash Scenario Models	Draft Advisory Circular	6/85
Antimisting Kerosene	NPRM	Hold
Interior Materials	NPRM	6/85
Analytical Modeling	Draft Advisory Circular	6/85

Other Major RE&D Programs

Traffic Collision Avoidance System (TCAS)

Objectives:

To Provide an Aircraft Separation Assurance Backup to Normal Air Traffic Control Operations, ATC Surveillance Coverage, and Primary Separation Assurance Outside ATC Surveillance Coverage.

Status:

• Design Guidelines for TCAS I (Final)	FY 1982 Completed
• Engineering Model, TCAS II Delivery	FY 1983 Completed
• MOPS, Minimum TCAS II RTCA (Final)	FY 1984 Completed
• National Standard, Minimum TCAS II (Final)	FY 1984 Completed
• Contract Award for TCAS Operational Deployment (LIP)	Sept/Nov 1984
• MOPS, Enhanced TCAS II (Final)	December 1985
• National Standard, Enhanced TCAS II	December 1985
• Complete TCAS Operational Deployment (LIP)	February 1988

Voice Switching and Control System (VSCS)

Objectives:

Develop a Voice Switching and Control System Which Can Provide the Flexible Communication Operations Necessary to Complement Sector Suite Flexibility in ARTCC's/Area Control Facilities (ACF). Implementation of VSCS Will Increase Operational Flexibility, Reduce Leased Line and Equipment Cost, Reduce Maintenance Costs, and Enhance Controller Productivity.

Status:

Specification Completed	March 1984
Issue RFP	February 1985
Contract Award	February 1986
Critical Design Review	January 1987
Production Award	January 1989
First Site Operational	April 1990

Flight Service Automation System (FSAS)

Objectives:

Develop an Automated Flight Service System (FSAS) to Replace the Existing Manual Flight Service Station (FSS) Operation. Implement Flight Service Data Processing Systems (FSDPS) at 23 ARTCC's and Establish 61 Automated Flight Service Stations (AFSS). Full Implementation Will Meet the Projected Increase in User Demand and Also Reduce the Cost of Individual Services.

Status:

F&E	Contract Awarded to E Systems (Models 1 & 2)	FY 1981 Completed
	First Delivery FAA Tech Center (Model 1)	December 1984
	First Operational Site Delivery (Model 1)	May 1985
	First FSDPS & FSAS Site Operational	December 1985
RE&D	Contract Award Model 2 Enhancements (Package 1)	*
	Enhancement Package 2	

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*Related to Outcome of Privitazation Study

Navigation

Objective:

To Quantify to the Extent Possible the Performance of Candidate Systems in the Areas of Accuracy, Reliability, Integrity, Coverage, and Operational Suitability to Facilitate Comparisons to Established Performance Standards.

Status:

Joint Preliminary DOD/DOT Recommendation for Future Radio Navigation System	November 1984
Final National Standard for Loran C	October 1983
Draft National Standard for NAVSTAR/GPS	September 1985
Publish Joint DOD/DOT Final Position for U.S. Provided Radio Navigation Systems Mix	September 1987

Microwave Landing System (MLS)

Objectives:

Develop and Implement a New Common Civil/Military Approach and Landing System That Will Meet the Full Range of User Operational Requirements Well Into the Future and Be Selected for International Standardization as the Replacement for the Current Instrument Landing System (ILS).

Status:

F&E	ICAO Approval of Angle/Data SARPS	FY 1981 Completed
	Avionics TSO Issued	FY 1982 Completed
	ICAO (AWOP) Approval of DME/P SARPS	FY 1983 Completed
	Key Decision Point #4 Approved	FY 1983 Completed
	Contract Award	FY 1984 Completed
	First Production Delivery	Sept 1986
	First System ORD	Oct 1986
RE&D	Complete Delivery of 20 (CHIP) Receivers	September 1984
	Complete Evaluation Reports for STEP	June 1985

Mode S/Data Link

Objectives:

To Provide the Improved Surveillance and Communications Capabilities Required to Meet the Need of Automated Air Traffic Control (ATC) in the 1980's. Specific Goals Are:

- Overcome Surveillance Limitations of the Present ATC Radar Beacon System (ATCRBS)
- Provide an Integral Two-Way Data Link
- Evolutionary Transition From the Present System
- Reasonable Cost to the Airborne User
- High Availability and Reliability

Status:

	Mode S/Data Link Equipments	
F&E	P.R. Issued	FY 1983 Completed
	Contract Award	October 1984
	First Delivery (Test)	FY 1987
	First Site Delivery	FY 1988
	Data Link Activities:	
RE&D	Draft National Aviation Standard	June 1983
	ICAO Standards Approved	Early 1987
	Final National Aviation Standard	April 1987
	Specific Message Applications Being Developed With Originating Programs — AERA, Weather, Etc.	

Automated En Route ATC (AERA)

Objectives:

Use Higher Levels of Automation in the Future System to Improve Safety and Efficiency

- Allow Pilots to Select More Fuel Efficient Routing
- Assist Controllers in Providing Conflict-Free Clearances
- Monitor Real Time ATC Operations for Potential Hazards and Overloads

Initial AERA Will Provide Planning Aids to Controllers (Early 1990's)

- Flight Plan Conflict Probes
- Conflict Free Metering Advisories
- Control Sector Workload Predictions

Later Capabilities Will Provide Traffic Management Aids (Mid-1990's)

- Resolution of Potential Conflicts
- Routing Around Severe Weather
- Use of Data Link for Clearance Delivery

Status:

• AERA 1 Specification Completed	11/84
• Complete AERA 2 Specification	12/85
• In First AAS Delivery	11/91

APPENDIX

Additional Material for the Record

Air Transport Association ata OF AMERICA
1709 New York Avenue, N.W.
Washington, D.C. 20006
(202) 626-4114

WILLIAM J. BURHOP
Senior Vice President
Government Affairs

April 3, 1985

Honorable Dan Glickman
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairman Glickman:

Attached are Air Transport Association views concerning the NAS Plan and FAA Research and Development programs that were the subject of Subcommittee on Transportation, Aviation and Materials hearings held on March 19, 1985.

We would appreciate having this statement made a part of the hearing record.

Sincerely,

Bill

Statement of the Air Transport Association
for the House Science and Technology Committee
Subcommittee on Transporatation, Aviation and Materials
Hearing, March 19, 1985

The Air Transport Association, on behalf of its 31 member airlines, appreciates the opportunity to present to the committee the following statement concerning the NAS Plan and related Research and Development matters. The airlines continue to advocate modernization and expansion of the nation's air traffic control system. They have long supported efforts to improve the air traffic control system in order to reduce congestion and delays and to insure that airspace will be managed safely and efficiently while accommodating increased demand. The National Airspace System plan, as contemplated, provides numerous important benefits including the replacement of aging Air Traffic Control (ATC) computers, the most expensive single element of the plan.

Aviation activity is increasing significantly, particularly the number of IFR (Instrument Flight Rules) controlled operations. FAA forecasts that future IFR traffic will increase dramatically and these demands are expected to exceed the capability of the ATC system in the next few years. In FY-86 IFR traffic handled by the enroute ATC system will increase from 32.8 million to 33.9 million and IFR tower operations will increase from 39.1 million to 40.9 million.

Not only is modernization important to accommodate expected growth, computer modernization is needed for reasons of reliability and efficiency.

The modernized ATC system is also expected to be far more productive. Significant gains will be realized through reduction and consolidation of many present ATC facilities. The FAA plans to reduce the existing 22 air route traffic control centers and 188 terminal radar control facilities to 23 area control facilities. If the NASP program goes forward as planned, FAA believes that in the future it will be able to manage the ATC system with a controller work force far less than that which might otherwise be needed without modernization. System users should also realize numerous benefits. For example, the airlines believe there is opportunity for a 2 to 4 percent fuel savings through increased ATC efficiency. Industry fuel costs amount to approximately $10 billion annually and represent nearly 30 percent of operating expenses. Any modernization effort that will retard fuel costs will be beneficial.

In our view, the approach FAA has selected for modernization is technically viable because:

- It is an efficient solution to provide the massive [illegible]utational capabilities needed for the advanced ATC system.

- It minimizes technical risks associated with both the new hardware and software technologies.

- It will provide controllers an easy transition to the new system.

- It will deliver the benefits of new technology in the ATC system provided it is fully funded and remains on schedule.

Although the airlines are generally satisfied with the technical approach being pursued by FAA, there is growing concern about the agency's ability to implement the modernization program on schedule.

While the execution of the National Airspace System plan and its associated research and development is well underway, significant funding deficiencies have occured. The funding levels needed to implement all elements of the plan have not been met in prior years and may fall short again in FY-86. If FAA receives an FY-86 appropriation for F&E and R, E&D funds at levels requested by the Administration, the cumulative funding shortfall for F&E and R, E&D will be about 1 billion dollars below approved program authorizations.

In order to accommodate these shortages, the FAA has adjusted the NAS plan expectations and schedule. Numerous projects and programs will be adversely impacted unless they are funded at levels consistent with the authorizations approved by Congress. For example, two important and closely related safety programs are in jeopardy. The NEXRAD (next generation weather radar) and terminal doppler weather radar programs have been frozen, and efforts are being made to find a less expensive way to provide weather radar. For aviation purposes, the FAA and the users have unique requirements for real-time weather information and off-the-shelf weather radars will not satisfy these requirements.

The reduction in R&D funding is also of concern to the airlines. These expenditure deficiencies will result in cuts to programs intended to produce increases in airport capacity that are needed to accommodate future growth. ATC procedural changes, now under study at FAA, could significantly increase airport capacity. These initiatives would:

- Reduce lateral separation for instrument approaches to independent parallel runways. If runway separation could be reduced to 3,000 feet from the current standard of 4,300 feet, it would add capacity at 10 airports.

- Reduce distance separation of aircraft within 15 miles of the airport from three to two and one-half miles. The reduced separation standard would increase capacity at all controlled airports.

- Revise procedures applicable to instrument approaches to converging runways, permitting simultaneous operations to those runways. Such procedures, if adopted, would improve capacity at 31 airports.

Another area of particular importance is the Engineered Performance Standards at the nation's busiest airports. By utilizing these standards the FAA calculates runway capacity. Many questions have been raised as to whether the currently employed standards actually reflect true airport capacity. We understand that FAA plans to award a contract to a research group to conduct an independent analysis of the standards at eight airports and their respective air route traffic control centers. This effort should be accorded a high priority because it offers the possibility of substantial airport capacity improvements.

We are aware that FAA is developing a long-range R&D plan to accommodate the use of more advanced technology such as satellites. This is a very important undertaking which is needed in conjunction with deliberation about airport and airway reauthorization legislation which must be approved when current law expires at the end of FY-87 and to assure that new technology can be accommodated within the framework of planned modernization.

In summary, ATC system modernization and expansion is long overdue. Its implementation will provide vital capacity and efficiency improvements and it will assure the continuation of the highest level of safety for our National Air Transportation System. FAA has committed more than 50% of the contracts needed to carry out the ATC modernization. We believe the agency has done a commendable job of keeping the program as close to schedule as possible under tight fiscal constraints.

The Air Transport Association, on behalf of its member airlines, continues to support the principle objectives of the NAS Plan and we hope every effort will be made to assure that the plan will be funded at levels consistent with program authorizations.

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

INFORMATION MANAGEMENT
& TECHNOLOGY DIVISION

March 26, 1985

B-217882

The Honorable Dan Glickman
Chairman, Subcommittee on Transportation,
  Aviation and Materials
Committee on Science and Technology
House of Representatives

Dear Mr. Chairman:

As requested in your March 6, 1985, letter and subsequent discussions with your office, we are providing you with a description of our ongoing work related to the Federal Aviation Administration's (FAA's) Host computer system replacement program. We are conducting this review at the request of the Chairman of the Subcommittee on Transportation, Committee on Appropriations, House of Representatives.

On May 4, 1984, we reported our interim observations on FAA's plans for major system acquisitions to the Subcommittee on Transportation (GAO/IMTEC-84-14). In this report, we provided the following observations regarding the Host program:

--FAA's planned test and evaluation of vendors' hardware and software may not be rigorous enough to adequately explore the operational performance which the Host computer is expected to provide.

--FAA was not planning to test newly developed functional software improvements on vendors' systems prior to a production decision.

--Based on our analysis of FAA's reports on 9020 computer capacity, FAA had the time and opportunity to address our concerns.

Our current review of FAA's Host program is a follow-on to our May 1984 report. In addition, we will respond to the Subcommittee on Transportation's concern as to whether FAA has a sufficient basis for a Host computer production decision in the July 1985 timeframe. Our report, scheduled for May 1985, will also incorporate our analysis of FAA's February 1985 response to concerns expressed during last year's Appropriations hearings. We will provide you with our report as soon as it is released.

Sincerely yours,

Warren G. Reed
Warren G. Reed
Director